Ultra-Low Freezer Service Manual

i.Series®

i.Series
iUF118, iUF126 (Version A)
iUF116, iUF124 (Version A)

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Contents

Section I: General Information 5

1 About this Manual 5
- 1.1 Intended Audience 5
- 1.2 Model References 5
- 1.3 Copyright and Trademark 5

2 Safety 5
- 2.1 Safety Definitions 5
- 2.2 Product Labels 6
- 2.3 Avoiding Injury 6

3 Compliance 7
- 3.1 Regulatory Compliance 7
- 3.2 WEEE Compliance 7
- 3.3 Electromagnetic Compliance 7

4 Model and Input Power 8

Section II: Installation & Configuration 9

5 Location Requirements 9

6 Install Components 9
- 6.1 Placement 9
- 6.2 Backup Refrigeration Systems (Optional) 9
  - 6.2.1 Optional Backup Refrigeration System Installation 10
  - 6.2.2 Backup System Contacts 10
- 6.3 Connect External Monitoring Devices 10
  - 6.3.1 Connect to Remote Alarm Interface 11
- 6.4 Start i.C3 Backup Power 11
- 6.5 Move Shelves 12

7 Prepare for Monitoring 13
- 7.1 Temperature Sensor 13
  - 7.1.1 Install Additional Temperature Sensor Through Upper Rear Port 13
  - 7.1.2 Install Additional Temperature Sensor Through Lower Rear Port 14
- 7.2 Chart Recorder (Optional) 14
  - 7.2.1 Chart Recorder Access 15
  - 7.2.2 Install Chart Paper 15
  - 7.2.3 Reorder Chart Paper 15

8 i.C³ Control System 16
- 8.1 Home Screen 16
  - 8.1.1 Home Screen Functions 16
- 8.2 Alarm Reference 16
- 8.3 Settings 17
  - 8.3.1 Chamber Temperature Setpoint 18
  - 8.3.2 User-Configurable Alarm Settings 18
  - 8.3.3 Non-Configurable Alarms 19
- 8.4 Sensor Calibration 20
  - 8.4.1 Calibrate Chamber Temperature Sensor 21

8.4.2 Calibrate Ambient Temperature Sensor . . . 22
8.4.3 Factory-Calibrated Sensors . . . 23
8.5 Factory Default Settings . . . 23
8.5.1 Restore Factory Default Settings . . . 24
8.5.2 Edit Factory Settings . . . 25

Section III: Maintenance & Service . . . 26

9 Maintenance . . . 26
9.1 Alarm Tests . . . 26
9.1.1 High Chamber Temperature Alarm Test . . . 26
9.1.2 Low Chamber Temperature Alarm Test . . . 27
9.1.3 Power Failure Alarm Test . . . 27
9.1.4 Door Open Alarm Test . . . 27
9.1.5 High Ambient Temperature Alarm Test . . . 28
9.1.6 Low Ambient Temperature Alarm Test . . . 28
9.1.7 Non-configurable Temperature Alarms . . . 29
9.2 Upgrade System Firmware . . . 29
9.3 Test and Replace Backup Battery . . . 29
9.3.1 Test Monitoring System Backup Battery . . . 29
9.3.2 Replace Monitoring System Backup Battery . . . 30
9.4 Defrost Ultra-Low Freezer . . . 30
9.4.1 Defrost and Clean Chamber . . . 30
9.4.2 Defrost and Clean Exterior Door Gasket . . . 32
9.4.3 Defrost and Clean Interior Doors . . . 32
9.5 Clean Ultra-Low Freezer . . . 33
9.5.1 Condenser . . . 33
9.5.2 Condenser Filter . . . 33
9.5.3 Exterior . . . 34
9.5.4 i.C³® Touchscreen . . . 34

10 Service . . . 35
10.1 Refrigerant . . . 35
10.2 Chamber Temperature Sensor Error Recovery . . . 35
10.3 Replace Access Control Solenoid . . . 36
10.4 Replace Exterior Door Hinge and/or Covers . . . 36
10.5 Adjust Exterior Door . . . 37
10.6 Replace Caster . . . 38

Section IV: Troubleshooting . . . 39

11 Troubleshooting . . . 39
11.1 General Operation Problems . . . 39
11.2 Chamber Temperature Problems . . . 41
11.3 Alarm Activation Problems . . . 44
11.4 Icing Problems . . . 46

Section V: Parts & Schematics . . . 47

12 Parts . . . 47
12.1 Front . . . 48
12.1.2 Exterior Door . . . 50
12.2 Side Panel . . . 51
12.3 Rear Panel . . . 51

12.4 Electrical Panel 52
12.5 Refrigeration Components 53
12.5.1 Refrigeration Compartment 53
12.5.2 Cascade Heat Exchanger Compartment 55
12.6 Interior 56

13 Schematics 57
13.1 Electrical Schematic 57
13.2 Refrigeration Schematic 58

Section VI: Warranty 59

14 Rel.i™ Product Warranty USA and Canada 59
14.1 Rapid Resolution 59
14.2 Compressor 59
14.3 Parts 59
14.4 Labor 59
14.5 Additional Warranty Information 59
14.6 Outside of USA and Canada 60

Section I: General Information

1 About this Manual

1.1 Intended Audience

This manual is intended for use by end users of the freezer and authorized service technicians.

1.2 Model References

Generic references are used throughout this manual to group models that contain similar features. For example, “iUF models” refers to all models of that size (iUF116, iUF118, iUF124, iUF126). This manual covers all ultra-low freezers, which may be identified singly, by their size, or by their respective “Series.”

1.3 Copyright and Trademark

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Helmer, Inc., doing business as (DBA) Helmer Scientific and Helmer.

2 Safety

The operator or technician performing maintenance or service on Helmer Scientific products must (a) inspect the product for abnormal wear and damage, (b) choose a repair procedure which will not endanger his/her safety, the safety of others, the product, or the safe operation of the product, and (c) fully inspect and test the product to ensure the maintenance or service has been performed properly.

2.1 Safety Definitions

The following general safety alerts appear with all safety statements within this manual. Read and abide by the safety statement that accompanies the safety alert symbol.

WARNING The safety statement that follows this safety alert symbol indicates a hazardous situation which, if not avoided, could result in serious injury.

CAUTION The safety statement that follows this safety alert symbol indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE The safety statement that follows this safety alert symbol indicates a situation which, if not avoided, could result in damage to the product or stored inventory.

2.2 Product Labels

The following general safety and information alerts appear on the product to identify potential hazards to the operator or service technician.

Caution: Safety hazard to operator or service technician

Caution: Electrocution/shock hazard

Caution: Electrostatic discharge (ESD) hazard

Caution: Unlock all casters

Earth / ground terminal

Protective earth / ground terminal

2.3 Avoiding Injury

- Review safety instructions before installing, using, or maintaining the equipment.
- Before moving unit, remove contents from the chamber.
- Before moving unit, ensure door is closed and latched, and casters are unlocked and free of debris.
- Before moving unit, disconnect the AC power cord and secure the cord.
- When moving unit, use assistance from a second person.
- Please refrain from grasping handle when moving unit to avoid injury from the door opening.
- Never physically restrict any moving component.
- Avoid removing electrical service panels and access panels unless so instructed.
- Use appropriate gloves when handling cold internal components and stored inventory.
- Keep hands away from pinch points when closing the door.
- Avoid sharp edges when working inside the electrical compartment and refrigeration compartment.
- Ensure biological materials are stored at recommended temperatures determined by standards, literature, or good laboratory practices.
- Proceed with caution when adding and removing samples from the freezer.
- Total freezer weight (including contents) is not to exceed 1400 lbs (635 kg).
- Individual shelf weight is not to exceed 160 lbs (73 kg).
- Use supplied power cord only.
- Do not drill holes in the cabinet or door. Drilling holes may damage the insulation in models equipped with vacuum-insulated panels, or may damage the evaporator coil, causing a loss of refrigerant.
- Using the equipment in a manner not specified by Helmer may impair the protection provided by the equipment.
- Decontaminate parts prior to sending for service or repair. Contact Helmer or your distributor for decontamination instructions and a Return Authorization Number.
- Ensure biological materials are stored safely, in accordance with all applicable organizational, regulatory, and legal requirements.
- The freezer is not considered to be a storage cabinet for flammable or hazardous materials.

3 Compliance

3.1 Regulatory Compliance

This product is certified to applicable UL and CSA standards by a NRTL.

3.2 WEEE Compliance

The WEEE (waste electrical and electronic equipment) symbol (right) indicates compliance with European Union Directive WEEE 2002/96/EC and applicable provisions. The directive sets requirements for labeling and disposal of certain products in affected countries.

When disposing of this product in countries affected by this directive:

- ► Do not dispose of this product as unsorted municipal waste.
- ► Collect this product separately.
- ► Use collection and return systems available locally.

For more information on the return, recovery, or recycling of this product, contact your local distributor.

3.3 Electromagnetic Compliance

This device is suitable for use in a specific electromagnetic environment. The end user of this device is responsible for ensuring the device is used in compliance with the following European Union directives and standards regarding EMC (electromagnetic compliance):

EMC Directive 2004/108/EC with Standards

- ► EN 55011:2009, inc. A1:2010
- ► EN 61000-3-2:2006, inc. A2:2009 Electromagnetic compatibility (EMC) Part 3-2
- ► EN 61000-3-3:2008 Electromagnetic compatibility (EMC) Part 3-3
- ► EN 61000-6-1:2007 Electromagnetic compatibility

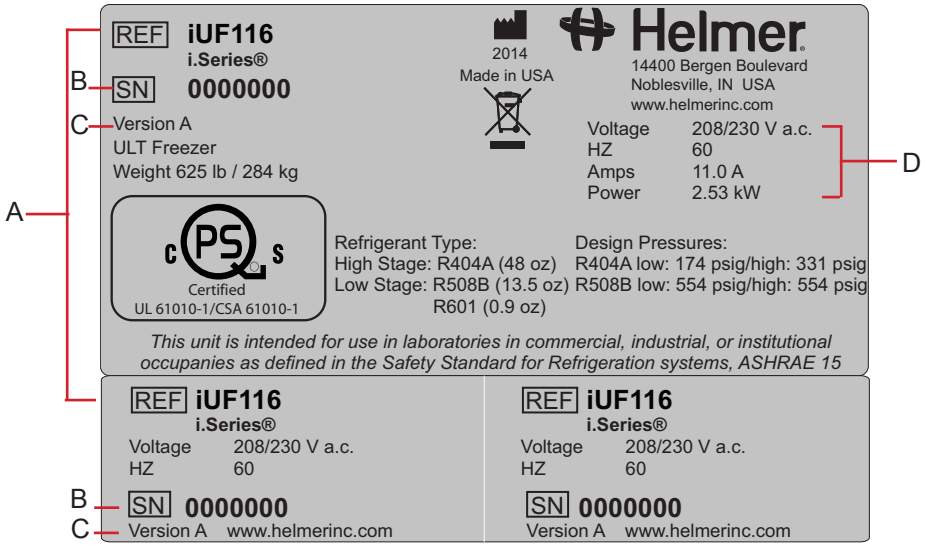
See Operations Manual for complete specifications.

4 Model and Input Power

NOTE Service information varies depending on the model and power requirements.

Series	Model	Voltage	Frequency	Current Draw
i.Series	iUF116	208/230V	60Hz	11.0 A
i.Series	iUF118	208/230V	60Hz	11.0 A
i.Series	iUF124	208/230V	60Hz	11.0 A
i.Series	iUF126	208/230V	60Hz	11.0 A

This information appears on the product specification label, located on the rear of the freezer. The model also appears on a label located in the chamber on the upper side of the right wall.



Top: Product specification label. Bottom: Chamber labels.

Label	Description
A	Model (REF)
B	Serial number
C	Version
D	Power requirements

Section II: Installation & Configuration

5 Location Requirements

- ► Has a dedicated 15 A grounded circuit with dedicated single point receptacle meeting the electrical requirements listed on the product specification label.
- ► Is clear of direct sunlight, high temperature sources, and heating and air conditioning vents.
- ► Minimum 8” (203 mm) above, and minimum 4” (102 mm) behind.
- ► Meets limits specified for ambient temperature and relative humidity.

6 Install Components

6.1 Placement

WARNING

- ► To prevent tipping, ensure door is closed and latched, and casters are unlocked and free of debris before moving freezer.
- ► The freezer is extremely heavy. Helmer recommends that two people work together to move the freezer.

1. Ensure all casters are unlocked and door is closed and latched.
2. Roll freezer into place and lock casters.
3. Adjust leveling feet as necessary to ensure freezer is level.
4. Connect AC power cord to a grounded outlet meeting the electrical requirements stated in Section I Item 4.

Leveling

1. Set a bubble level on top of freezer cabinet. Orient the level front-to-back on the top of the cabinet.
2. Using a 9/16” open-end wrench, back the jam nut away from the weld nut.
3. Hand-thread the leveling legs downward until they make contact with the floor.
4. Using a 5/8” open-end wrench, rotate the leveling legs downward until the front casters touch the floor.
5. Check the bubble level to ensure the freezer is parallel to the floor (front to back), or angled slightly back from vertical.
6. Check the leveling legs and rear casters to ensure the freezer contacts the floor at four points.
   - ► Adjust both leveling legs as necessary to achieve four contact points.
7. Hand-thread the jam nuts upward until they make contact with the weld nut.
8. Place a 5/8” open-end wrench on the leveling legs to prevent them from rotating while the jam nut is tightened.
9. Using a 9/16” open-end wrench, snug the jam nuts against the weld nuts.

6.2 Backup Refrigeration Systems (Optional)

A backup refrigeration system may be installed to ensure the chamber temperature remains below a critical level in the event of an extended power failure or an equipment failure. If the chamber temperature rises to a pre-determined setpoint, the backup refrigeration system will inject carbon dioxide (CO_2) or liquid nitrogen (LN_2) into the chamber to keep the chamber temperature within a specified range.

NOTICE The temperature setpoint for the CO_2 / LN_2 injection should be set to a value within the freezer operating range (-50 °C to -86 °C).

6.2.1 Optional Backup Refrigeration System Installation

Follow the backup refrigeration system manufacturer's directions to install the backup system.

NOTICE Do not drill holes in the cabinet. Drilling holes may damage the insulation in models equipped with vacuum-insulated panels, or may damage the evaporator coil, causing a loss of refrigerant.

NOTE

- Helmer recommends installing the backup refrigeration system door switch along the handle-side of the door. This will prevent the door switch from interfering with the vacuum port, located near the top of the door.
- External sensors for the backup refrigeration system may be installed through ports in the side or rear of the freezer cabinet. Refer to **7.1.1** (Install Additional Temperature Sensor Through Upper Rear Port), and **7.1.2** (Install Additional Temperature Sensor Through Lower Rear Port) for instructions on installing sensors or tubing through the rear ports.
- Three threaded screw holes have been provided on the interior back wall of the cabinet to assist in installing and routing the backup refrigeration system. Holes are #8 -32 thread, with Phillips screws temporarily installed.
- Backup CO_2 and LN_2 Refrigeration Systems are available from Helmer Scientific.

Figure 1: Threaded screw holes and distribution port for backup refrigeration system installation.

6.2.2 Backup System Contacts

Remote contacts are provided on the back of the freezer for the backup refrigeration system. The backup system may be connected to the i.C³ monitoring and control system with the remote contacts. If the backup system is activated, the system activation will be communicated to the i.C³ through the remote contacts. An icon will be displayed on the i.C³ to indicate that the backup system has been activated.

NOTICE The i.C³ monitoring and control system does not control the operation of the backup refrigeration system.

6.3 Connect External Monitoring Devices

CAUTION

- The interface on the remote alarm monitoring system is intended for connection to the end user's central alarm system(s) that uses normally-open or normally-closed dry contacts.
- If an external power supply exceeding 30 V (RMS) or 60 V (DC) is connected to the remote alarm monitoring system's circuit, the remote alarm will not function properly; may be damaged; or may result in injury to the user.

NOTE All alarm conditions, including power failure, are transmitted through the remote alarm contacts.

The remote alarm interface is a relay switch with three terminals:

- ► Common (COM)
- ► Normally Open (NO)
- ► Normally Closed (NC)

Terminals are dry contacts and do not supply voltage. Interface circuit is either normally open or normally closed, depending on terminals used. Requirements for your alarm system determine which alarm wires must connect to terminals. The terminals on the remote alarm interface have the following maximum load capacity:

- ► 0.5 A at 30 V (RMS): 1.0 A at 60 V (DC)

6.3.1 Connect to Remote Alarm Interface

1. Switch battery ON/OFF switch **OFF**. Switch AC ON/OFF switch **OFF**.
2. On the back of the freezer, locate the remote alarm terminals.
3. Connect remote alarm wires to appropriate terminals, according to requirements for your alarm system.
4. Use a cable tie to relieve strain on alarm wires (as necessary).
5. Switch AC ON/OFF switch **ON**. Switch battery ON/OFF switch **ON**.
6. Touch **Mute or raise the high alarm limit** to disable the high temperature alarm while freezer reaches operating temperature. (If high alarm limit is changed, it must be changed back prior to operation of freezer.)

6.4 Start i.C3 Backup Power

The monitoring system has a backup battery system, enabling a period of continuous monitoring if power is lost.

NOTE The monitoring system and chart recorder (if equipped) will start on battery power alone. If the freezer was previously not connected to AC power and the battery is switched on, the monitoring system and chart recorder will begin running on battery power.

Battery life varies by manufacturer as well as voltage level remaining. Providing full power is available and no battery-related alarms are active, backup power for the monitoring system is available for approximately 20 hours (the Low Battery alarm will activate after approximately 18 hours of battery use).

NOTICE Use only a replacement battery which meets specifications of the monitoring system / Access Control backup battery 800174-1 found in Section V, Item 12.4.

NOTE If AC power is lost, the monitoring system will automatically disable some features to prolong battery power. Data collection will continue until battery power is depleted.

NOTE The backup battery system does not operate the refrigeration system.

The battery is located in the electrical compartment, on the bottom left of the freezer.

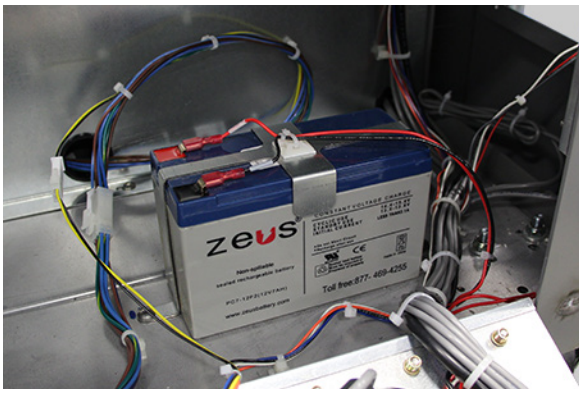


Figure 2: Monitoring system / Access control backup battery.

Model	Battery	Service Kit #
iUF (all)	(1) rechargeable 12 V lead acid sealed battery	800174-1

Battery is switched off for shipping. Switch battery on to provide monitoring system with backup power in the event of AC power failure.

6.5 Move Shelves

Figure 3: Interior doors.

Shelves.

Shelf clip and shelf standard.

CAUTION

- ► Use appropriate gloves when handling cold interior components and stored inventory.
- ► Keep hands away from pinch points when closing the door.
- ► Before moving shelves, ensure they are empty for safe lifting.
- ► Maximum shelf load is not to exceed 160 lbs (73 kg).
- ► Total freezer weight (including contents) is not to exceed 1400 lbs (635 kg).

NOTICE

- ► Before moving storage components, protect stored items in freezer from extended exposure to adverse temperature.
- ► When removing or replacing storage racks, do not allow the storage rack to set on the top edge of a partially-open interior door.
- ► To avoid damage to the interior door hinges, do not apply upward or downward force to the interior doors.

Remove a shelf

1 With one hand, lift one end of the shelf from the shelf clips.
2 With the other hand, lift the opposite end of the shelf from the shelf clips.
3 While holding the shelf at an angle, remove it from the chamber and set aside.

Remove a shelf clip

1 Grip the shelf clip and pivot it upward to remove the lower tab from the standard.
2 Remove the upper tab from the standard.

Install a shelf clip

1 Insert the upper tab into a slot in the standard.
2 Pivot the shelf clip downward and insert the lower tab into the corresponding slot in the standard.

Install a shelf

1 Insert shelf into chamber, holding it at an angle.
2 Lower one end of the shelf onto the shelf clips.
3 Pivot the shelf downward, lowering the opposite end onto the shelf clips.

7 Prepare for Monitoring

7.1 Temperature Sensor

The i.C3 monitoring and control system obtains temperature readings from the chamber temperature sensor. The sensor is located on the lower back wall of the chamber.

Figure 4: Chamber temperature sensor (located behind cover).

7.1.1 Install Additional Temperature Sensor Through Upper Rear Port

Additional temperature sensors may be installed through a port on the rear wall of the cabinet, in the top-left corner. The port consists of two plastic caps - one inside the cabinet and one on the outside. The cabinet insulation fills the void between the plugs.

NOTICE Do not drill holes in the cabinet. Drilling holes may damage the insulation in models equipped with vacuum-insulated panels, or may damage the evaporator coil, causing a loss of refrigerant.

NOTE

- ► Helmer recommends installing additional sensors through the upper or lower rear ports provided.
- ► The upper rear port may also be used to install tubing for an optional (field-installed) CO_2 / LN_2 backup refrigeration system. Refer to Section II, Item 6.2 for additional information.

Install the Sensor:

1 Remove the plastic plugs on the outside and inside of the cabinet
2 Use a screwdriver or similar tool to pierce the insulating foam. Insert the tool from the outside, through the foam, to the inside of the cabinet.

NOTE Use a tool with a diameter only large enough to accommodate the sensor wiring.

3 Secure the sensor inside the cabinet as necessary.
4 Seal the hole in the foam using Permagum putty or press-in cork tape, ensuring a tight seal.

7.1.2 Install Additional Temperature Sensor Through Lower Rear Port

Additional temperature sensors may be installed through a port on the rear wall of the cabinet, in the bottom-left corner. The port consists of two plastic caps – one inside the cabinet and one on the outside. The cabinet insulation fills the void between the plugs.

NOTICE Do not drill holes in the cabinet. Drilling holes may damage the insulation in models equipped with vacuum-insulated panels, or may damage the evaporator coil, causing a loss of refrigerant.

NOTE

- ► Helmer recommends installing additional sensors through the upper or lower rear ports provided.
- ► The lower rear port may also be used to install a temperature sensor for an optional (field-installed) CO_2 / LN_2 backup refrigeration system. Refer to Section II, Item 6.2 for additional information.

Install the Sensor:

1 Remove the plastic plugs on the outside and inside of the cabinet.
2 Use a screwdriver or similar tool to pierce the insulating foam. Insert the tool from the outside, through the foam, to the inside of the cabinet.

NOTE Use a tool with a diameter only large enough to accommodate the sensor wiring.

3 Secure the sensor inside the cabinet as necessary.
4 Seal the hole in the foam using Permagum putty or press-in cork tape, ensuring a tight seal.

7.2 Chart Recorder (Optional)

If installed, refer to the Temperature Chart Recorder Operation and Service Manual on CD.

The temperature chart recorder has a battery system, enabling a period of continuous operation if power is lost. Battery life varies by manufacturer as well as voltage level remaining. Providing full power is available, backup power for the chart recorder is available for up to 14 hours.

Prior to use:

- ► Add paper.
- ► Calibrate chart recorder to match chamber temperature.

7.2.1 Chart Recorder Access

Open door by pressing and releasing the door.

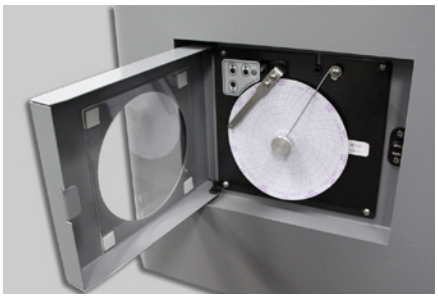


Figure 5: Chart recorder access door.

7.2.2 Install Chart Paper

1. Press and hold **C** button. When stylus begins to move left, release button. The LED flashes to indicate current temperature range.
2. When stylus stops moving, remove chart knob then move knob up and away.
3. Place chart paper on chart recorder.
4. Gently lift stylus and rotate paper so current time line corresponds to time line groove.

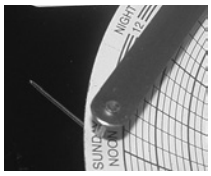


Figure 6: Align stylus to time line groove.

5. Hold chart paper and install chart knob.

NOTE For accurate temperature reading, ensure that current time is aligned with time line groove when chart knob is tightened.

6. Confirm temperature range is set to the correct value.
7. Press and hold **C** button. When stylus begins to move right, release button.
8. Confirm stylus is marking temperature correctly.

7.2.3 Reorder Chart Paper

Chart paper: 800197-1 (52 sheets)

Available on the Helmer estore at: http://store.helmerinc.com/ or directly from Helmer Scientific at 1-800-743-5637.

8 i.C³ Control System

i.Series® Ultra-Low freezers are equipped with the i.C³ monitoring and control system. The i.C³ system combines temperature monitoring and control into a single user interface.

8.1 Home Screen

The Home screen is the default screen and is displayed when:

- ► The **Home** button is touched from any other screen
- ► There is no interaction for two minutes on any screen other than those used to enter a password

Figure 7: Home Screen

8.1.1 Home Screen Functions

NOTE Refer to the i.C³ User Guide for options available on all i.C³ screens.

- ► View current interior cabinet and ambient temperature readings
- ► View the current system time and date
- ► Access any of the five home screen apps (touch **i.C³ APPS** for additional applications)
- ► View information about current alarm events
- ► View whether the monitoring system is running on battery power
- ► Mute audible alarms
- ► Shortcut to Event log
- ► View Unit ID

8.2 Alarm Reference

If an alarm condition is met, an alarm activates. Some alarms are visual only; others are visual and audible. Some alarms are sent through the remote alarm interface.

The table indicates if an alarm is audible (A), visual (V), or sent through the remote alarm interface (R).

Alarm	Alarm Type
High Chamber Temperature	A, V, R
Low Chamber Temperature	A, V, R
Sensor Failure: Chamber Temperature Control	A, V, R
High Ambient Temperature	V, R
Low Ambient Temperature	V, R
Sensor Failure: Ambient Temperature	A, V, R
Refrigeration System: High Stage Compressor Temperature	A, V, R
Sensor Failure: High Stage Compressor Temperature	A, V, R

Alarm	Alarm Type
Sensor Failure: High Stage Condenser Temperature	A, V, R
Refrigeration System: High Stage Compressor Failure	A, V, R
Refrigeration System: High Refrigerant Pressure	A, V, R
Refrigeration System: Low Stage Compressor Temperature	A, V, R
Sensor Failure: Low Stage Compressor Temperature	A, V, R
Refrigeration System: Low Stage Compressor Failure	A, V, R
Sensor Failure: Heat Exchanger Temperature	A, V, R
Low Battery	V, R
No Battery	A, V, R
AC Power Failure	A, V, R
AC Power Failure: High Voltage	A, V, R
AC Power Failure: Low Voltage	A, V, R
AC (Conditioned) High Voltage	A, V, R
AC (Conditioned) Low Voltage	A, V, R
Power Management System Failure (Optional)	V, R
Power Up	-
Door Open (Time)	A, V, R
Clean Filter	V, R
CO_2 / LN_2 Backup System Active (Optional)	V, R
Communication Failure 1: Control Board	A, V, R
Communication Failure 2: Configuration File	A, V, R
Communication Failure 3: Database	A, V, R
Date / Time Change	-

8.3 Settings

Through the i.C³ monitoring and control system, current temperature and alarm settings may be viewed and changed. The i.C³ monitor and control system is programmed at the factory.

NOTE ► If the Settings screen is password protected or if viewing settings for the first time, enter factory default password of “1234”.

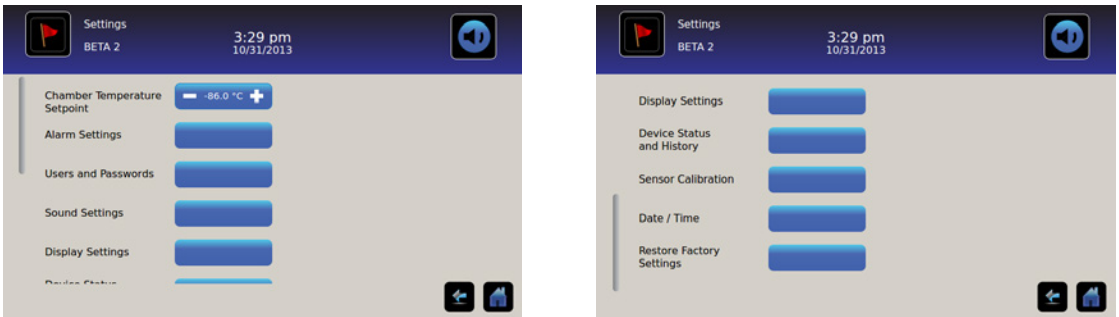


Figure 8: Settings screens.

To change a setting, first access the Settings screen, then the setting.

8.3.1 Chamber Temperature Setpoint

Temperature setpoints are programmed at the factory. Setpoints can be viewed and changed through the i.C³ monitoring and control system.

NOTE Default chamber temperature setpoint is -80.0 ºC. The lowest setpoint that can be set is -86.0°C.

Change the setpoint if:

► Your organization requires a chamber temperature other than -80.0 ºC.

Confirm:

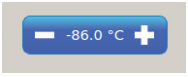
► Freezer has been placed per location requirements in Section II, Item 5.

► Preventive maintenance has been completed per operation manual.

Perform the following:

1 Touch **i.C³ APPS**, **i.C³ Settings**.

2 Enter the Settings password (default password is “1234”).



3 Touch **+** or **–** on the **Chamber Temperature Setpoint** spin box.

► The setpoint is the temperature at which the freezer operates.

4 Touch **Home** to exit the Settings screen.

Setting	Initial Factory Value
Chamber Temperature Setpoint	-80.0 ºC
Delay on Start-Up	1 minute

8.3.2 User-Configurable Alarm Settings

The following alarm settings may be changed by the operator. The setpoint for temperature alarms may be changed (where applicable), as well as the time delay between when the alarm condition commences and when the visual and audible alarms are initiated.

Alarm	Description	Default Setpoint	Default Time Delay
High Temperature	Chamber temperature reading is above high temperature alarm setpoint	-70.0 °C	0 minutes
Low Temperature	Chamber temperature reading is below low temperature alarm setpoint	-90.0 °C	0 minutes
Power Failure	Power to unit has been disrupted	n/a	1 minute
Sensor Failure	Temperature sensor is not functioning properly	n/a	0 minutes
Door Open (Time)	Door is open beyond user-specified duration	n/a	1 minute
High Ambient	Ambient temperature reading is above high ambient alarm setpoint	30.0 °C	15 minutes
Low Ambient	Ambient temperature reading is below low ambient alarm setpoint	15.0 °C	15 minutes

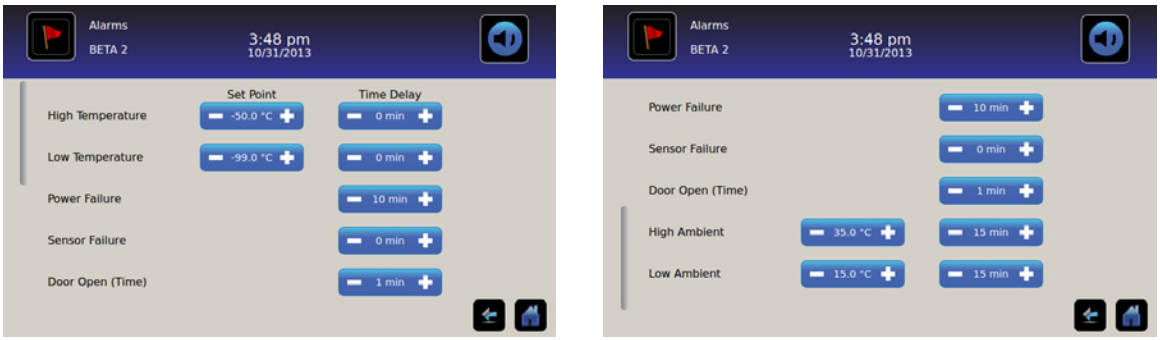


Figure 9: Alarm Settings screens.

Change an alarm setting:

1 Touch **i.C³ APPS**, **Settings**.
2 Enter the Settings password (default password is “1234”).
3 Touch **Alarm Settings**.
4 Touch **+** or **–** on the spin box corresponding to the alarm setting to be changed.
5 Touch **Home** to exit the Alarm Settings screen.

NOTE Changing a temperature alarm setting to a value within the operating range of the freezer may trigger a temperature alarm.

8.3.3 Non-Configurable Alarms

The freezer has alarms that are not user-configurable. These alarms indicate operational conditions that require the attention of the operator or a qualified service technician. Refer to **11** (Troubleshooting) for information regarding non-configurable alarms.

NOTE ► Touch **Mute** to silence the alarm.

Alarm	Description
Compressor Temperature	Low stage or high stage compressor discharge temperature is too high
Condenser Temperature	High stage condenser discharge temperature is too high
Clean Filter	Filter cleaning interval has been reached
CO_2 / LN_2 Active	CO_2 / LN_2 backup refrigeration system has been activated
Low Battery	Rechargeable battery voltage is low
No Battery	Rechargeable battery voltage is too low or battery is disconnected
Refrigeration System	► Refrigerant pressure is too high ► High stage compressor temperature is above the upper limit ► Low stage compressor temperature is above the upper limit ► High stage compressor has failed ► Low stage compressor has failed
Emergency Mode	Chamber temperature sensor has failed, and i.C³ system is operating high stage and low stage compressors at 100% duty cycle

Alarm	Description
Communication Failure	Communication Failure 1 ► Triggered if communication is lost between i.C³ display board and control board ► Unit will continue to run with previously-saved settings ► Screen will not display temperature changes or alarm conditions ► i.C³ system will continue to reset until connection is re-established Communication Failure 2 ► Triggered if communication is lost between i.C³ display board and internal system memory ► Unit will continue to run with previously-saved settings Communication Failure 3 ► Triggered if the database is corrupted ► The database is archived and a new database is automatically created ► Unit will continue to run with previously-saved settings

8.4 Sensor Calibration

Sensor calibration values are programmed at the factory. Sensor values can be viewed and changed through the i.C³ monitoring and control system.

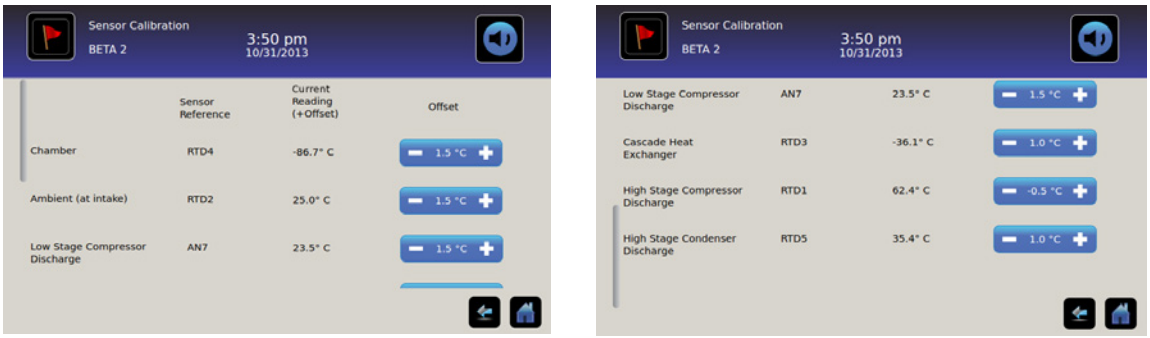


Figure 10: Sensor Calibration screens.

NOTICE Changing calibration settings affects operation of the freezer. Do not change settings unless instructed in product documentation or by Helmer Technical Service.

NOTE

- If password protection is enabled, enter factory default password of “1234” to reach the Sensor Calibration screen.
- When there is no interaction for two minutes, the Sensor Calibration screen closes and returns to the Home screen.
- To change sensor offset values other than Chamber and Ambient, enter the technician password, available from Helmer Technical Service.

8.4.1 Calibrate Chamber Temperature Sensor

NOTICE

- ► The chamber temperature sensor is factory-calibrated and should be verified on an annual basis, and calibrated when required or as dictated by facility standard operating procedures.
- ► Calibration must be done with an independent thermometer that is calibrated and traceable standard.
- ► Temperature sensor is fragile; handle with care.

NOTE If the displayed temperature is within ±1.0 °C of the measured temperature, calibration is not required.

Verify chamber (monitor/control) temperature sensor is reading chamber temperature correctly by comparing sensor reading to temperature read by an independent calibrated and traceable thermometer. If sensor is not reading correctly, change the offset value displayed on the monitor.

CAUTION Use appropriate gloves when handling cold interior components and stored inventory.

Sensor specifications:

- ► Initial factory calibration setting varies
- ► Offset value can be changed from -10.0 ºC to +10.0 ºC
- ► Sensor is 100 Ω platinum RTD

Required tools:

- ► Independent thermometer (with a 5’ (1524mm) lead or greater), calibrated and traceable per national standards.
- ► Zip-tie, to attach thermometer to sensor

Calibrate sensor:

1. Move contents within the freezer to gain access to the sensor.
2. Using a zip-tie, attach the independent thermometer to the cover surrounding the sensor.

NOTE Ensure the independent thermometer is not touching the cabinet wall or any other metallic components inside the cabinet.

3. Close the door and allow the chamber temperature to stabilize for a minimum of five minutes.
4. Observe and note the thermometer temperature.
   - ► If the temperature variance is within ±1.0 °C of the temperature displayed on the i.C³ screen, calibration is not necessary.
   - ► If the temperature variance is greater than ±1.0 °C of the temperature displayed on the i.C³ screen, calibrate the sensor.
5. Touch, **i.C³ APPS**, **Settings.**
6. Enter the Settings password (default password is “1234”).
7. Touch **Sensor Calibration**.
8. Touch **+** or **–** on the **Offset Chamber** spin box to increase or decrease the offset value until the displayed value matches the measured value.

NOTE After saving the new temperature value, the displayed temperature may take several minutes to change to match the new value. This is normal.

9 Touch **Home** to exit the Sensor Calibration screen.
10 Remove thermometer from the sensor cover.
11 Replace the contents of the freezer.

8.4.2 Calibrate Ambient Temperature Sensor

NOTICE
- ► The ambient temperature sensor is factory-calibrated and should not be changed unless directed by Helmer Technical Service.
- ► Calibration must be done with an independent thermometer that is calibrated and traceable standard.
- ► Temperature sensor is fragile; handle with care.

NOTE
- ► The ambient temperature sensor should be calibrated only if the sensor calibration is found to be outside of the acceptable calibration range.
- ► If the displayed temperature is within ±1.0 °C of the measured temperature, calibration is not required.

Verify ambient temperature sensor is reading ambient temperature correctly by comparing sensor reading to temperature read by an independent, calibrated and traceable thermometer. If sensor is not reading correctly, change the offset value displayed on the monitor.

CAUTION Avoid sharp edges when working inside the refrigeration compartment.

Sensor specifications:
- ► Initial factory calibration setting varies
- ► Offset value can be changed from -10.0 ºC to +10.0 ºC
- ► Sensor is 100 Ω platinum RTD

Required tools:
- ► Independent thermometer (with a 5’ (1524mm) lead or greater), calibrated and traceable per national standards.
- ► Zip-tie, to attach thermometer to sensor

Calibrate sensor:
1 Remove the condenser grill to gain access to the sensor.
2 Using a zip-tie, attach the independent thermometer to the same point as the sensor.

NOTE Ensure the independent thermometer is not touching the condenser or any other metallic components surrounding the sensor.

3 Allow the thermometer temperature to stabilize for a minimum of three minutes.
4 Observe and note the thermometer temperature.
   - ► If the temperature variance is within ±1.0 °C of the temperature displayed on the i.C³ screen, calibration is not necessary.
   - ► If the temperature variance is greater than ±1.0 °C of the temperature displayed on the i.C³ screen, calibrate the ambient sensor.

5 Touch, **i.C³ APPS**, **Settings.**
6 Enter the Settings password (default password is “1234”).
7 Touch **Sensor Calibration**.
8 Touch **+** or **–** on the **Ambient** offset spin box to increase or decrease the offset value until the displayed value matches the measured value.

NOTE After saving the new temperature value, the displayed temperature may take several minutes to change to match the new value. This is normal.

9 Touch **Home** to exit the Sensor Calibration screen.
10 Remove thermometer from the sensor.
11 Replace the condenser grill.

8.4.3 Factory-Calibrated Sensors

NOTICE The low stage compressor discharge sensor, cascade heat exchanger sensor, high stage compressor discharge sensor, and high stage condenser discharge sensor are factory-calibrated and do not require field calibration.

These sensors are difficult to reach to verify the accuracy of any calibrations.

8.5 Factory Default Settings

Settings listed below are calibration and operational settings that were set at the factory before the freezer was shipped.

NOTE Factory default settings may not be the same as the settings that were factory-calibrated.

Setting	Restored Value
Home Screen Application Icons	i.C³ APPS, Settings, Temperature Graph, Information Logs, Download
Display Brightness	High (3 symbols)
Password (for Settings screen)	1234
Sounds	On
Alarm Volume	9
Alarm Tone	3
Temperature Calibration Values	Varies (calibrated at factory)
Low Stage Compressor Discharge Probe Offset Value	0 °C
High Stage Compressor Discharge Probe Offset Value	0 °C
Heat Exchanger Probe Offset Value	0 °C
High Stage Condenser Discharge Probe Offset Value	0 °C
Unit ID	Serial number entered at factory
Date Format	MM/DD/YYYY
Day	Not affected (maintained in real-time clock)
Month	
Year	
Time Format	12-hour

Setting	Restored Value
Minute	Not affected (maintained in real-time clock)
Hour	
AM/PM	
Language	Language previously selected during setup
Temperature Units	°C
Password Protection (for Settings screen)	On
Ambient Temperature Display	On
LN_2 / CO_2 System Input	Off
USB Port	On
RS-232 Port	On
Access Control as Home Page	On
High Chamber Temperature Alarm Setpoint	-70.0 °C
High Chamber Temperature Alarm Time Delay	0 minutes
Low Chamber Temperature Alarm Setpoint	-90.0 °C
Low Chamber Temperature Alarm Time Delay	0 minutes
High Ambient Temperature Alarm Setpoint	30.0 °C
High Ambient Temperature Alarm Time Delay	15 minutes
Low Ambient Temperature Alarm Setpoint	15.0 °C
Low Ambient Temperature Alarm Time Delay	15 minutes
Power Failure Alarm Time Delay	1 minute
Sensor Failure Alarm Time Delay	0 minutes
Door Open Alarm Time Delay	1 minute
Chamber Setpoint	-80.0 °C
Chamber Hysteresis	0.1°C
Delay on Start-Up	1 minute

8.5.1 Restore Factory Default Settings

Factory settings may be simultaneously returned to factory default values.

NOTE
- ► Factory default settings may not be the same as the settings that were factory-calibrated.
- ► If Factory Default Settings are restored, all calibration values will be lost.

1 Touch **Home**, **i.C³ APPS**, **Settings**.
2 Enter the Settings password (default password is “1234”).
3 Touch **Restore Factory Settings**.
2 The “Restore Factory Settings?” message appears. Do one of the following:
- ► Touch **Yes**. The message screen closes and factory settings are restored.
- ► Touch **No**. The message screen closes and factory settings are not restored.

8.5.2 Edit Factory Settings

NOTE ► Contact Helmer Technical Service for instructions in changing factory settings.

Several of the i.C3 screens and functions are configured at the factory. The screens and functions listed below are set at the factory and may be changed at the direction of Helmer Technical Service.

Setting	Description
Device Control Settings Screen	Toggle the Device Control Settings screen **on** or **off**
Alternate Home Screen	Toggle the Alternate Home screen **on** or **off**
Access Control Screen	Toggle the Access Control screen **on** or **off**

Section III: Maintenance & Service

CAUTION Review all safety instructions prior to performing maintenance. Refer to Section I, Item 2.

NOTICE
- ► Before performing maintenance, protect items in freezer from extended exposure to adverse temperature.
- ► Allow chamber temperature to stabilize at setpoint before moving product back into the freezer.

NOTE Refer to the operation manual for the preventive maintenance schedule.

9 Maintenance

9.1 Alarm Tests

Test alarms to ensure they are working correctly. The freezer has alarms for high chamber temperature, low chamber temperature, door open (time), high ambient temperature, low ambient temperature, and power failure.

NOTE There is no testing method for non-configurable alarms.

CAUTION Use appropriate gloves when handling cold interior components and stored inventory.

NOTICE Before testing alarms, protect items in freezer from extended exposure to adverse temperature.

9.1.1 High Chamber Temperature Alarm Test

NOTE
- ► The high chamber temperature alarm test should require no more than 90 seconds.
- ► If the i.C³ monitoring and control system did not display a high temperature alarm during the alarm test, contact Helmer Technical Service.

Required tools:

► Electric heat gun, or equivalent heat source

Test the high alarm:

1 Identify setting for high alarm setpoint.
   - **a** Touch **i.C³ APPS**, **Settings**.
   - **b** Enter the Settings password (default password is “1234”).
   - **c** Touch **Alarm Settings**.
   - **d** Observe and note the setting for the high alarm.
   - **e** Touch **Home**.
2 Move contents within the freezer to gain access to the chamber sensor.
3 Using a heat gun or similar auxiliary heat source (use low setting, if available), apply short bursts of heat to the chamber sensor.
4 Observe the temperature on the i.C³ display at which the high temperature alarm activates.

5 The alarm should activate within 2.0°C of high alarm setpoint. If the value is more than 2.0°C different, contact Helmer Technical Service for further instruction.
6 Remove the heat gun and replace the contents of the freezer.
7 Close the freezer door.

9.1.2 Low Chamber Temperature Alarm Test

NOTE
- ► To simulate a low temperature alarm condition, raise the low alarm temperature setpoint to a point above current chamber temperature displayed on the i.C³ monitoring and control system.
- ► The low chamber temperature alarm test does not test the accuracy of the low chamber alarm; the test verifies that the low chamber alarm is functional.
- ► If the i.C³ monitoring and control system did not display a low temperature alarm during the alarm test, contact Helmer Technical Service.

Test the low alarm:

1 Touch **i.C³ APPS**, **Settings**.
2 Enter the Settings password (default password is “1234”).
3 Touch **Alarm Settings**.
4 Change the Low Temperature alarm setpoint to a point above the chamber temperature.
   a Touch **+** on the Low Temperature setpoint spin box to change the value to 0° C.
   b The low temperature alarm will activate immediately.
5 If the low temperature alarm does not activate, contact Helmer Technical Service.
6 Change the Low Temperature setpoint to the original setting.
7 Touch **Home**.

9.1.3 Power Failure Alarm Test

NOTE
- ► During a power failure, the power failure alarm activates and the battery provides power to the monitoring system.
- ► During the power failure test, do not switch the battery switch off.

1 Change Power Failure delay setting to 0 minutes.
   a Touch **i.C³ APPS**, **Settings**.
   b Enter the Settings password (default password is “1234”).
   c Touch **Alarm Settings**.
   d Touch **+** or **–** on the Power Failure spin box to change the value to 0 minutes.
2 Switch AC ON/OFF switch **OFF**.
   ► Power failure alarm will activate immediately.
3 Switch AC ON/OFF switch **ON**.
   ► Power failure alarm will clear and audible alarm will cease.
4 Change the Power Failure time delay to the original setting.

9.1.4 Door Open Alarm Test

1 Change Door Open (Time) delay setting to 0 minutes.
   a Touch **i.C³ APPS**, **Settings**.
   b Enter the Settings password (default password is “1234”).
   c Touch **Alarm Settings**.
   d Touch **+** or **–** on the Door Open (Time) spin box to change the value to 0.

2 Open door.
► Alarm will activate immediately.
3 Close door.
► Alarm will clear and audible alarm will cease.
4 Change the Door Open (Time) setting to the original setting.

9.1.5 High Ambient Temperature Alarm Test

CAUTION Avoid sharp edges when working inside the refrigeration compartment.

NOTICE Temperature sensor is fragile; handle with care.

NOTE If the i.C³ monitoring and control system did not display a high ambient temperature alarm during the alarm test, contact Helmer Technical Service.

Test the high ambient alarm:

Required tools:

► Electric heat gun, or equivalent heat source

Test the high ambient alarm:

1 Identify setting for high ambient alarm setpoint.
   a Touch **i.C³ APPS**, **Settings**.
   b Enter the Settings password (default password is “1234”).
   c Touch **Alarm Settings**.
   d Observe and note the setting for the high ambient alarm.
   e Touch **Home**.
2 Remove the condenser filter grill.
3 Using a heat gun or similar auxiliary heat source (use low setting, if available), apply short bursts of heat to the chamber sensor.
4 Observe the temperature on the i.C³ display at which the high ambient temperature alarm activates.
5 The alarm should activate within 2.0°C of high alarm setpoint. If the value is more than 2.0°C different, contact Helmer Technical Service for further instruction.
6 Remove the heat gun.
7 Reinstall the condenser filter grill.

9.1.6 Low Ambient Temperature Alarm Test

CAUTION Avoid sharp edges when working inside the refrigeration compartment.

NOTICE Temperature sensor is fragile; handle with care.

NOTE If the i.C³ monitoring and control system did not display a low ambient temperature alarm during the alarm test, contact Helmer Technical Service.

Required tools:

- ► (1) 8 oz. (250 mL) glass half-full of ice water
- ► Clean shop rag or several clean paper towels used together

Test the low ambient alarm:

1. Touch **i.C³ APPS**, **Settings**.
2. Enter the Settings password (default password is “1234”).
3. Touch **Alarm Settings**.
4. Change the Low Ambient time delay setting to 0 minutes.
   - ► Touch **–** on the Low Ambient time delay spin box to change the value to 0 minutes.
5. Observe and note the Low Ambient setpoint.
6. Lift the condenser grill from the magnetic anchor points at the top of the grill, and remove by pulling the grill forward to about a 30 º angle and lifting the tabs out of the tab holes.
7. Using the half full glass of ice and water mixture, dip the rag or paper towel into the ice water mixture saturating the rag or towels.
8. Wrap the moistened rag or towel around the ambient probe.
9. Observe the ambient display temperature begin to drop.
10. When the alarm is activated, note the temperature on the monitor.
11. Compare the recorded temperature at which the alarm activated to the low ambient alarm setpoint. The recorded temperature should be within 1ºC of the low alarm setpoint. If the alarm triggers outside of the +/- 1°C range, verify sensor calibration.
12. Remove moistened rag/towels from the sensor.
13. Replace the condenser grill.
14. Change the Low Ambient time delay to the original setting.
15. Touch **Home**.

9.1.7 Non-configurable Temperature Alarms

NOTICE

- ► Some temperature alarms are not user-configurable. As such, the alarm setpoint cannot be changed to simulate a high temperature alarm.
- ► Due to the inaccessibility of the temperature sensor, it is not recommended that an alarm condition be simulated through manual means for these alarms.

Non-configurable temperature alarms:

- ► **Low Stage Compressor Discharge Temperature Alarm**
- ► **High Stage Compressor Discharge Temperature Alarm**
- ► **High Stage Condenser Discharge Temperature Alarm**
- ► **Cascade Heat Exchanger Temperature Alarm**

9.2 Upgrade System Firmware

Helmer may occasionally issue updates for the i.C³ firmware. Follow upgrade instructions included with the firmware update.

9.3 Test and Replace Backup Battery

9.3.1 Test Monitoring System Backup Battery

On all i.C³ screens, the Battery icon will appear in the header bar when the system is running on battery power and the screen brightness will automatically be reduced. The monitoring system will automatically disable some features to extend battery life.

Test the battery:

1 Switch AC ON/OFF switch **OFF**.
   - ► Screen will continue to display information with reduced brightness.
   - ► Battery icon will appear on the screen.
   - ► If the display is blank, replace battery.

2 Switch AC ON/OFF switch **ON**.

9.3.2 Replace Monitoring System Backup Battery

The monitoring system backup battery is a serviceable part installed behind the electrical compartment access panel below the chamber.

WARNING Removal of the electrical compartment access panel will expose electrical wiring carrying line voltage and control voltage. Ensure the freezer is powered off before removing the access panel.

CAUTION Avoid sharp edges when working inside the electrical compartment.

NOTE
- ► Replacement of the battery will not require stored inventory to be removed from the freezer during the replacement procedure. It is not recommended that the chamber door be opened until after this procedure is completed.
- ► A replacement battery is available from Helmer Technical Service.
- ► Order Service kit 800174-1.
- ► Refer to the installation instructions included with the battery service kit

9.4 Defrost Ultra-Low Freezer

9.4.1 Defrost and Clean Chamber

Frost accumulation is normal. The freezer chamber must be periodically defrosted to prevent excessive frost from interfering with door operation and storage of product, or the freezer's ability to maintain temperature.

If the freezer door or interior doors do not operate correctly, or if the freezer cannot maintain the chamber setpoint temperature, defrost the chamber.

WARNING
- ► Do not use a secondary heat source to defrost the freezer. The use of an electrical heat source (such as a heat gun) could create an electrocution hazard if the user comes into contact with water from the defrosted chamber.
- ► Defrosting the freezer will create excessive water in the work area. Take necessary precautions to prevent slip hazards.
- ► The freezer is extremely heavy. Helmer recommends that two people work together to move the freezer.

CAUTION
- ► Use appropriate gloves when handling cold interior components and stored inventory.
- ► Keep hands away from pinch points when closing the door.

NOTICE

- ► Before defrosting chamber, protect items in freezer from extended exposure to adverse temperature.
- ► Do not use a secondary heat source to defrost the freezer. The use of a secondary heat source (such as a heat gun) may create additional pressure within the refrigeration system and may damage system components.
- ► Allow chamber temperature to stabilize at setpoint before moving product back into the freezer.

Required tools:

► Dry cotton cloth

Defrost the chamber:

1. Move stored product to an equivalent freezer.
2. Switch battery ON/OFF switch **OFF**.
3. Switch AC ON/OFF switch **OFF**.
4. Disconnect the freezer from AC power.
5. Remove the AC power cord from the freezer.
6. Move the freezer to a location where water can be captured as the chamber thaws, preferably close to a floor drain.
7. Open the chamber door. Prop the door open, ensuring the method used does not damage the door gasket.
8. Remove and defrost the interior doors.

NOTE Refer to Section III, Item 9.5.3 for instructions on defrosting interior doors.

9. Allow the freezer to set for 24 hours to allow accumulated frost to melt. After 24 hours, check to verify that the interior is free of frost.
10. Clean interior surfaces and door gasket with soft cotton cloth and non-abrasive liquid cleaner.
11. Wipe the interior surfaces and door gaskets with a dry cotton cloth to remove moisture.

NOTE All moisture must be removed before powering the freezer on. Any remaining moisture will re-freeze in the chamber and may require more frequent defrosting than indicated in the preventive maintenance schedule.

12. Install the interior doors.
13. Close the chamber door.
14. Remove any accumulated moisture from the floor.
15. Move the freezer to the original location.
16. Reattach the AC power cord to the freezer.
17. Reconnect the freezer to AC power.
18. Switch AC ON/OFF switch **ON**.
19. Switch battery ON/OFF switch **ON**.
20. Touch **Mute** to disable the high temperature alarm while freezer reaches operating temperature.
21. Once the freezer reaches the setpoint it is ready for use.
22. Return stored product to the freezer.

9.4.2 Defrost and Clean Exterior Door Gasket

If the exterior door gasket has excessive frost or ice build-up and requires defrosting, Helmer recommends defrosting the entire chamber. Please refer to Section III, Item 9.4.1 for instructions.

After defrost is complete, carefully inspect the door gasket for tears or damage, and ensure proper adhesion to the exterior door.

9.4.3 Defrost and Clean Interior Doors

Frost accumulation is normal. The interior doors must be periodically defrosted to prevent excessive frost from interfering with door operation and storage of product, or the freezer's ability to maintain temperature.

Defrost the interior doors according to the preventive maintenance schedule outlined in the operation manual.

CAUTION Use appropriate gloves when handling cold interior components.

NOTE

- ► This procedure does not require the freezer door to remain open for an extended period of time.
- ► Stored inventory may be kept in the freezer while this procedure is performed.
- ► Do not use warm water to defrost the interior doors.
- ► A heat gun may be used to defrost the interior doors.

Required tools:

► Dry cotton cloth

Defrost the doors:

1. Open the chamber door.
2. Remove one interior door:
   - **a** Open the interior door.
   - **b** Lift the interior door up to free the hinge pins from the hinges.
   - **c** Remove the interior door from the freezer.
3. Close the chamber door.
4. Allow the interior door to set for approximately four hours to allow accumulated frost to melt. After four hours, verify that the interior door is free of frost and moisture in metal framework.
5. Clean interior door with soft cotton cloth and non-abrasive liquid cleaner.
6. Wipe the interior door with a dry cotton cloth to remove moisture.
7. Install the interior door:
   - **a** Align the hinge pins on the interior door with the corresponding hinges in the cabinet.
   - **b** Lower the interior door so the hinge pins are inserted into the hinges.
   - **c** Close the interior door.
8. Close the chamber door.

NOTE Repeat steps 1 through 8 for each of the interior doors.

9.5 Clean Ultra-Low Freezer

9.5.1 Condenser

WARNING If a solvent-based liquid cleaner is used to clean the condenser, an electrocution hazard could exist if the user comes into contact with the liquid cleaner and a power source. Disconnect the freezer from AC power prior to cleaning with a liquid cleaner.

CAUTION Avoid sharp edges when working inside the refrigeration compartment.

NOTICE
- ► If the freezer has been powered down to clean the condenser, protect items in freezer from extended exposure to adverse temperature.
- ► Allow chamber temperature to stabilize at setpoint before moving product back into the freezer.

Required tools:
- ► Soft brush
- ► Vacuum cleaner

Clean the condenser:
1. Remove the condenser grill from the freezer.
   - **a** Lift the grill upward.
   - **b** Pull the top of the grill away from the freezer.
   - **c** Lift the grill and disengage the tabs at the bottom of the grill from the freezer cabinet.
2. Clean the condenser using a soft brush and a vacuum cleaner.
3. Install the condenser grill.
   - **a** Insert the tabs at the bottom of the grill into the corresponding holes on the freezer cabinet.
   - **b** Pivot the top of the grill toward the freezer until the magnets engage the condenser grill.

9.5.2 Condenser Filter

In environments where freezer is exposed to excessive lint or dust, the condenser filter may require cleaning more frequently than stated in preventive maintenance schedule.

CAUTION
- ► Avoid sharp edges when removing and installing the condenser grill and filter.
- ► Use appropriate gloves when handling stored inventory.

Required tools:
- ► Sink with hot and cold water taps

Clean the filter:
1. Tilt the condenser grill forward.
2. Remove the condenser filter from the condenser grill.
   - **a** Lift the filter upward.
   - **b** Remove the filter from the slots on the back of the grill.
3. Clean the condenser filter with warm water and a mild detergent.
   - **a** Rinse the filter under warm water.
   - **b** The filter must be rinsed from back to front, so that water flows in the opposite direction of the airflow.
4. Allow the condenser filter to dry thoroughly.

5 Install the condenser filter in the condenser grill.
   a Insert the filter into the slots on the back of the grill.
   b The filter must be installed so the wire mesh faces toward the condenser (inside).
6 Pivot the top of the grill toward the freezer until the magnets engage the condenser grill.

NOTE If the condenser filter is damaged, a replacement filter may be ordered from Helmer Technical Service. Order Service Kit 800159-1.

9.5.3 Exterior

Required tools:

- ► Dry cotton cloth
- ► Non-abrasive liquid cleaner

Clean exterior surfaces with soft cotton cloth and non-abrasive liquid cleaner.

9.5.4 i.C³® Touchscreen

Clean touchscreen with a soft, dry cotton cloth.

NOTE Do not use solvent or alcohol-based cleaners to clean the i.C³ touchscreen.

10 Service

CAUTION

- Review all safety instructions prior to servicing refrigeration system(s). Refer to Section I, Item 2.
- Service should only be performed by trained refrigeration technicians.
- Avoid sharp edges when working inside the refrigeration compartment.

NOTICE The refrigeration systems are sealed at the factory. Do not connect gauge manifolds or add refrigerant to either system unless directed by Helmer Technical Service.

10.1 Refrigerant

Full initial refrigerant charge varies by models and can be found on the chart below.

Model	Power Requirements	Refrigerant	Initial Charge
iUF116 iUF118	208/230 V, 60 Hz	R-404A (high stage) R-508B (low stage) R-601 (low stage)	48 oz. (1361 g) 13.5 oz (383 g) 0.56 oz (26 g)
iUF124 iUF126		R-404A (high stage) R-508B (low stage) R-601 (low stage)	48 oz (1351 g) 16 oz. (454 g) 0.56 oz (26 g)

10.2 Chamber Temperature Sensor Error Recovery

If the i.C³ monitoring and control system loses communication with the chamber temperature sensor or if the sensor fails, the i.C³ system will operate the refrigeration system in Emergency Mode to preserve the inventory stored in the freezer.

NOTE

- The alarm display on the Home screen will display “Emergency Mode”.
- The Emergency Mode alarm setting is not adjustable.
- The alarm is only displayed on the Home screen.
- If the Emergency Mode alarm is active, contact Helmer Technical Service.

If the refrigeration system is operating in Emergency Mode, the high stage compressor will operate continuously and the low stage compressor will operate normally, unless one or more of the following conditions are met:

- An over-pressure condition exists in the high stage refrigeration system
- A second Sensor Failure alarm (compressor temperature, condenser temperature, or heat exchanger temperature) is active beyond the duration specified in the Sensor Failure time delay setting
- The cascade temperature is above -20°C

If one or more of the conditions above are met, the high stage and low stage compressors will be automatically powered off.

NOTICE

- If the high and low stage compressors are automatically powered off, the chamber temperature may rise above above the established limits necessary to maintain integrity of stored inventory.
- If the freezer has automatically powered down, protect items in freezer from extended exposure to adverse temperature.

The chamber temperature sensor error may be cleared and the freezer returned to normal operation by following the chamber temperature sensor error recovery procedure.

Error recovery procedure:

1 Switch battery ON/OFF switch **OFF**.
2 Switch AC ON/OFF switch **OFF**.
   - Wait 30 seconds before powering the freezer back on.
3 Switch AC ON/OFF switch **ON**.
4 Switch battery ON/OFF switch **ON**.

10.3 Replace Access Control Solenoid

If there is an Access Control Solenoid failure, the freezer must be accessed with the override key. The Access Control Solenoid is a serviceable assembly installed in the door.

NOTE

- A replacement Access Control Solenoid assembly is available from Helmer Technical Service.
- Order Service Kit part number 800195-1.
- Complete installation instructions are included with the Access Control Solenoid service kit.

10.4 Replace Exterior Door Hinge and/or Covers

Cracked or broken hinges or hinge covers can be replaced.

Figure 11: Exterior door hinge with covers installed.

NOTE

- A replacement Hinge and Cover Kit is available from Helmer Technical Service.
- Order Service Kit part number 800178-1.
- Complete installation instructions are included with the Hinge and Cover service kit.

10.5 Adjust Exterior Door

Required tools:

- #1 Phillips screwdriver
- #2 Phillips screwdriver
- #20 Torx driver
- 1/2” box wrench
- Ratchet strap
- Straight edge / ruler
- Loctite 242
- Calipers

Adjust the cabinet to door gap:

1. Verify door gasket is outside of the desired gap of 0.46” to 0.52” (12mm to 13mm) measured between the door plastic mullion (a) and the cabinet plastic mullion (b).
2. Using a #2 Phillips screwdriver, remove the screws securing the hinge covers.
3. Remove the hinge covers from the hinge.
4. Place the ratchet strap around the cabinet, adjacent to the hinge being adjusted.
5. Tighten the ratchet strap to secure the door.
6. Using a #1 Phillips screwdriver, remove the four screws in door-side of the hinge.
7. Tighten or loosen the ratchet strap as necessary to achieve a gap of 0.46” to 0.52” (12mm to 13mm) between the door and the cabinet.
8. Apply Loctite 242 to the four screws that were removed from door side of the hinge.
9. Install the four screws.
10. Using a #1 Phillips screwdriver, tighten the screws.
11. Remove the ratchet strap.
12. Verify that gap remains within tolerance. If not, repeat steps to adjust.
13. Reinstall the hinge covers on the hinge.
14. Using a #2 Phillips screwdriver, reinstall the screws securing the hinge covers.

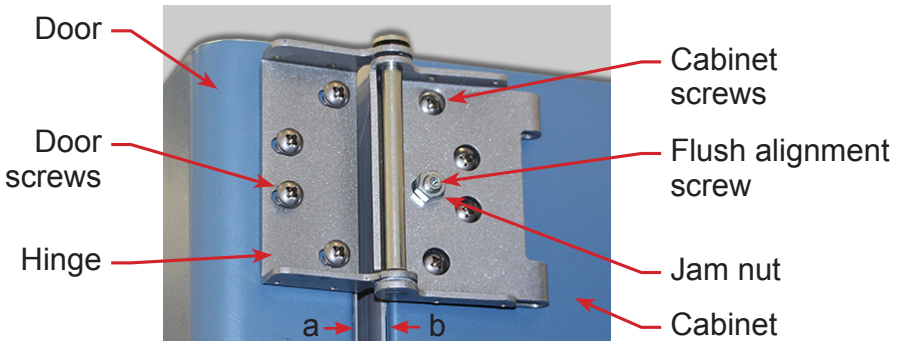


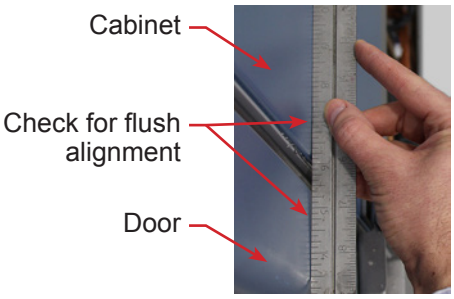
Figure 12: Exterior door hinge detail.

Align the door flush with the cabinet:

NOTE This procedure provides instruction for adjusting one hinge. Any of the three hinges may be adjusted using this procedure.

1. Using a #2 Phillips screwdriver, remove the screws securing the hinge covers.
2. Remove the hinge covers from the hinge.

3 Hold a straight-edge (ruler) on the side of the freezer, spanning the door and cabinet, adjacent to the hinge being adjusted.
4 Using a #20 Torx driver, tighten or loosen the adjustment screw (in the hinge) until the right edge of the door is flush with the right side of the cabinet.
5 While holding the adjustment screw with a #20 Torx driver, tighten the jam nut with a 1/2” box wrench.
6 Reinstall the hinge covers on the hinge.
7 Using a #2 Phillips screwdriver, reinstall the screws securing the hinge covers.



Verify door is aligned flush with side of cabinet.

10.6 Replace Caster

If a caster is bent or broken, it can be replaced.

NOTE
- A replacement Caster Kit is available from Helmer Technical Service.
- Order Service Kit part number 800188-1
- Refer to the instructions included with the Caster service kit.

Section IV: Troubleshooting

11 Troubleshooting

CAUTION
- ► Review all safety instructions prior to troubleshooting. Refer to Section I, Item 2.
- ► Troubleshooting should only be performed by trained refrigeration technicians.

NOTE To order Replacement Parts, contact Helmer Technical Service (1-800-743-5637).

11.1 General Operation Problems

Problem	Possible Cause	Action
The exterior door does not open easily.	Exterior door handle bushings are worn.	► Confirm the exterior door handle is firmly attached to the freezer door. Replace the door handle bushings if the handle is loose.
	Excessive frost or ice build up on mullion because cleaned or defrosted gasket and closed while still wet.	► Defrost the interior and verify it is dry before closing door.
An interior door does not open easily.	Frost accumulation around the interior door gasket.	► Defrost the interior door (refer to Section III, Item 9.4.3).
	Interior door hinge is bent.	► Replace the interior door hinge.
	Interior door retaining clip is worn or bent.	► Replace the interior door retaining clip.
The monitor display is difficult to read.	Screen brightness is set too low.	► Change the screen brightness. Touch i.C³ APPS, Brightness. Touch the icon corresponding to the desired brightness setting.
The monitoring system is not responding.	Digital electronics are locked because of an interruption in power.	► Reset the monitoring system by turning battery and AC power off and back on.

Problem	Possible Cause	Action
"Refrigeration System" alarm is displayed on the monitor.	Refrigerant pressure or temperature is too high due to improper airflow.	► Ensure that freezer has been installed with proper clearances. ► Check that ambient temperature is in the acceptable range. ► Check the air filter and condenser face, and clean or replace as needed. ► Check condenser face, clean as needed. ► Check the operation of the consenser fan, and repair or replace as needed.
	Refrigerant pressure or temperature is too high because the freezer is not being used as intended.	► Ensure that products being placed in the freezer are pre-frozen to avoid introducing an excessive heat load.
	Refrigerant pressure or temperature is too high because the low stage compressor is not operating when it should be.	► Check the status of the low stage compressor. Touch i.C³ APPS, Settings (enter the Settings password), Device Status and History. Scroll as needed to view the compressor status. ► Verify CP is initiating SSR2 to be ON by checking that the LED for SSR2 is lit. ► Verify control voltage is leaving the SSR2 relay. ► Check the line voltage high pressure switch, ensuring switch is closed. ► Check the low stage compressor start components.
	Refrigerant pressure or temperature is too high because the high stage compressor is not operating when it should be.	► Contact Helmer Technical Service.
	One or more system components has failed.	► Contact Helmer Technical Service.
"Sensor Failure" alarm is displayed on the monitor.	One or more of the temperature sensors has failed, or sensor wiring is an open circuit.	► Check the i.C³ Event Log Detail screen for the specific sensor failure. Touch i.C³ APPS, Information Logs, Event Logs. Touch the individual event to view the sensor failure code. ► Check the sensor wire connection to the control board and secure the connection if necessary. ► Confirm the sensor is providing resistance in the range of 73 Ω to 110 Ω. Replace the sensor if resistance is outside of specified range.
The chart recorder is not marking the temperature.	The chart paper knob is not tight.	► Tighten the chart paper knob.
	Stylus pressure is not correct.	► Confirm stylus is pressing firmly against paper.
	The chart recorder motor has stopped running.	► Remove the chart paper and press the reset button (behind the chart paper). Reinstall the chart paper.
	The chart recorder is defective.	► Replace the chart recorder.

11.2 Chamber Temperature Problems

Problem	Possible Cause	Action
The chamber temperature displayed is higher or lower than the actual temperature.	Chamber temperature sensor is not calibrated.	► Check the chamber temperature calibration. Change the calibration if necessary (refer to Section II, Item 8.4.1).
	Connections for the chamber temperature sensor are loose.	► Check the sensor wire connection to the control board and secure the connection if necessary. ► Check the continuity of the sensor wiring. Replace the sensor if necessary. ► Confirm the sensor is providing resistance in the range of 73 Ω to 110 Ω. Replace the sensor if resistance is outside of specified range. ► Check the CP performance by utilizing jumper at J11. Place the jumper across both pins. The screen should display 4.0°C +/-1°C.
	Digital electronics are locked because of an interruption in power.	► Reset the monitoring system by turning battery and AC power off and back on.
	Compressor solid state relay is faulty.	► Confirm the relay is operating correctly. Replace the relay if necessary.
	A component is faulty or internal connections are loose.	► Contact Helmer Technical Service.
The compressors run continuously.	Freezer setpoint is set too low.	► Confirm the setpoint is set within the operating range and change it if necessary (refer to Section II, Item 8.3.1).
	Chamber temperature sensor is not calibrated.	► Check the chamber temperature sensor calibration. Change the calibration if necessary (refer to Section II, Item 8.4.1).
	Compressor solid state relays are faulty.	► Confirm the control board indicates both compressors should not be running. Touch i.C³ APPS, Settings (enter the Settings password), Device Status and History. ► If both compressors should not be running, check the compressor solid state relays. ► If the compressor solid state relays are closed, replace the relays.
	i.C³ control board is faulty.	► Confirm the control board is calling for both compressors to be running. Touch i.C³ APPS, Settings (enter the Settings password), Device Status and History. ► If both compressors should be running, no further action is needed. ► If both compressors should not be running, check the control board compressor relays. If the relays are closed, replace the control board.

Problem	Possible Cause	Action
The chamber temperature meets an alarm condition, but the appropriate temperature alarm is not active.	Temperature alarm setpoint was changed.	► Check the current setpoints for the temperature alarms. Change the setpoints if necessary (refer to Section II, Item 8.3.1).
The chamber temperature does not reach or stabilize at setpoint.	Ambient air temperature is too high.	► Confirm freezer location meets requirements. Refer to Section II, Item 5.
	Warm product was placed at sensor.	► Move product and monitor chamber temperature. Wait to see if temperature has stabilized or lowers. ► Check remaining items.
	Excessive frost has accumulated in the chamber.	► Defrost chamber. Refer to Section III, Item 9.4.1.
	Temperature control sensor is faulty.	► Check accuracy of temperature probe ► Confirm the sensor is providing resistance in the range of 73 Ω to 110 Ω. Replace the sensor if resistance is outside of specified range. ► Install jumper across J11 on the CP board: Display 4C+/-1 - NO call Helmer Technical support ► Display 4C +/-1 - YES - CP board process is good, check connections at CP board and under connector pin, wait 8 hours to see if unit stabilizes.
	Condenser filter is dirty.	► Check condenser filter, clean as needed.
	Condenser fan running slowly or not at all.	► Check voltage and wiring to fan motor at connector ► Check voltage output at CP board relay J42 ► Replace motor.
	Low stage compressor starting and stopping after 2 to 10 minutes run time	► Check cascade temperature - touch i.C3 settings (enter password) / device status and history - Cascade temperature maintaining below -20ºC - NO - Contact Helmer Technical Service - YES - During pull down and starting at ˜ -35ºC - normal behavior. - YES - Check compressor amperage, OHMs and start components.

Problem	Possible Cause	Action
	High Stage running: Low stage not running.	► Check cascade temperature - touch i.C3 settings (enter password) / device status and history - Cascade has to reach ~-35C before low stage will start. Did cascade reach ~-35C? - NO contact Helmer Technical Service - YES it is normal to see the cascade heat exchanger elevate above -35C and could reach -20C: if this happens the low stage will cycle off NORMALLY, until the low stage reaches~-35C and the low stage will start again. This is most typical during pull down. At normal operation when at setpoint, this will not occur. ► Check i.C3 Control board for lit compressor LEDs (D21 and D22) to energize compressor relays - ON, check remaining items: OFF - Contact Helmer Technical Support. ► Check i.C3 Control board for lit compressor LEDs (D21 and D22) to energize compressor relays - ON, check remaining items: OFF - Contact Helmer Technical Support. ► Check solid state relay - replace if control power is present but relay is not allowing voltage to pass. ► Verify operation of High pressure switch(s) control and line is not open. ► Check start components. ► Contact Helmer Technical Service.
	Compressor(s) not running	► Check power to unit. ► Verify call for both compressors - touch i.C3 settings (enter password) device status and history - call for both on -NO - Reboot -YES - Check remaining items ► Check i.C3 Control board lit compressor LEDs (D21 and D22) to energize compressor relays -OFF - Contact Helmer Technical Support -ON - Check remaining items ► Check solid state relay. Replace if control power is present but relay is not allowing voltage to pass. ► Compressor buzzing or humming - replace start components. ► Amperage check and OHM compressor. Contact Helmer Technical Support.
	Both compressors running	► Check cascade temperature - touch i.C3 settings (user password) / device status and history - Cascade temperature maintaining below -20ºC BUT greater than -50ºC. Normal. Allow to stabilize. ► Cascade temperature -50ºC or colder. Oil logging. Defrost unit per Section III, Item 9.4.1. Low stage low on charge. Contact Helmer Technical Support to utilize tech service thermocouples.

11.3 Alarm Activation Problems

Problem	Possible Cause	Action
The freezer is in an alarm condition, but alarms are not audible.	Audible alarms are muted.	► Verify that audible alarms are not muted. If time remaining is greater than five minutes, change MUTE timer value to five minutes and wait until timer resets. ► Check alarm volume level and tone selection. touch i.C3 settings (enter password) / sound settings.
	i.C³ control board is faulty.	► Confirm the control board is operating correctly. Replace if necessary.
	Speaker is faulty.	► Replace display assembly
	A component is faulty or internal connections are loose.	► Contact Helmer Technical Service.
The freezer meets an alarm condition, but the appropriate alarm is not active.	Alarm setpoint was changed.	► Check the current setpoints for the alarms (refer to Section II, Item 8.3.2).
	A component is faulty or internal connections are loose.	► Contact Helmer Technical Service.
The High Temperature alarm activates when the door is opened, then clears shortly after the door is closed.	High temperature alarm setpoint is set too low.	► Check the setpoint and change it if necessary (refer to Section II, Item 8.3.2).
	Connections for the chamber temperature sensor are loose.	► Check the sensor wire connection to the control board and secure the connection if necessary.
	A component is faulty or internal connections are loose.	► Contact Helmer Technical Service.
The freezer is connected to power, but the AC Power Failure alarm is active.	Outlet connection is faulty.	► Verify power at the outlet. Repair the original outlet or connect to a different outlet if necessary.
	Power cord is faulty.	► Confirm the power cord is connected securely. Secure the power cord if necessary.
	ON/OFF AC power switch is faulty.	► Replace the ON/OFF AC power switch.
	ON/OFF AC power switch is OFF.	► Switch the ON/OFF AC power switch ON.
	A component is faulty or internal connections are loose.	► Contact Helmer Technical Service.
	Circuit breaker is tripped.	► Reset the circuit breaker.
	Circuit breaker is faulty.	► Replace the circuit breaker.
	Power supply board is faulty.	► Replace the power supply board.
	Power filter is faulty	► Replace power filter.

Problem	Possible Cause	Action
The Door Open alarm is activating sporadically.	Exterior door is not closing completely.	► Confirm the hinges are not damaged. Replace the hinges if necessary.
	Exterior door is closing but not sealing completely.	► Defrost the exterior door gasket (refer to Section III, Item 9.4.2).
	Connection for the exterior door switch is loose.	► Test the switch wiring connection and secure the connection if necessary.
	Exterior door switch is faulty.	► Replace the magnetic door switch.
	i.C³ control board is faulty.	► Confirm the control board is operating correctly. Replace if necessary.
	Door Open Timeout is set to zero, causing the alarm to activate immediately when the door is opened.	► Check the time delay for the Door Open alarm. Change the time delay if necessary.
The Condenser Temperature alarm is active.	Condenser filter is dirty.	► Check the condenser filter. Clean if necessary.
	Side panels missing from cabinet base	► Reinstall side panels to ensure proper airflow across condenser and compressors.
	Condenser fan is not running.	► Check the condenser fan wiring connection. Secure the connection if necessary. ► Check power to the fan and electrical connections. If power to the fan, replace fan. If no power to the fan, call Helmer Technical Support. ► Check the CP operation of relay at J42.
	Connection for the condenser temperature sensor is loose.	► Check the sensor wire connection to the control board and secure the connection if necessary. ► Ohm out.
	Condenser temperature sensor is faulty.	► Check the sensor wire connection to the control board and secure the connection if necessary. ► Check the continuity of the sensor wiring. Replace the sensor if necessary. ► Confirm the sensor is providing resistance in the range of 100 Ω to 115 Ω. Replace the sensor if resistance is outside of specified range.
The No Battery alarm is activating sporadically.	Monitoring system backup battery voltage is low.	► Replace the monitoring system backup battery (refer to Section III, Item 9.3.2).
	Power supply board voltage is incorrect	► Contact Helmer Technical Service.
The High Temperature alarm is activating sporadically.	Chamber temperature sensor is not calibrated.	► Check the chamber temperature sensor calibration. Change the calibration if necessary (refer to Section II, Item 8.4.1).
	A component is faulty or internal connections are loose.	► Contact Helmer Technical Service.

11.4 Icing Problems

Problem	Possible Cause	Action
There is excessive ice in the chamber, on the interior doors, or on the exterior door gasket.	Humid air is entering the chamber.	► Verify the door is aligned, gap is within spec, closing tightly, and sealing correctly. Correct issues as necessary. ► Check for tears, loose door gasket, or damaged door gasket. Replace if necessary. ► Defrost the chamber, exterior door gasket, and interior doors if necessary (refer to Section III, Items 9.4.1, 9.4.2, and 9.4.3).
	Exterior door is not closing completely.	► Defrost the exterior door gasket if necessary (refer to Section III, Item 9.4.2). ► Confirm the hinges are not damaged. Replace the hinges if necessary. ► Confirm door gaps and alignment are appropriate. ► Check door latch to ensuer it is securing and remains secure.
	Relative humidity around freezer is too high.	► Confirm freezer location meets requirements (refer to Section II, Item 5).

Section V: Parts & Schematics

12 Parts

CAUTION

- Review all safety instructions prior to replacing parts (refer to Section I, Item 2).
- Replacing parts should only be performed by trained refrigeration technicians.

NOTICE

- Before replacing parts, protect items in freezer from extended exposure to adverse temperature.
- Allow chamber temperature to stabilize at setpoint after replacing parts or after extended door opening.

NOTE

- Replacement parts that are included in a service kit are designated with an “800-level” part number (800XXX-X).
- All Service Kits have been designed to aid in field service and installation. Service kits include all parts and installation instructions needed for field installation.
- Individual replacement parts are designated with part numbers other than “800-level” part numbers.
- Service kits and replacement parts are available from Helmer Technical Service. (1-800-743-5637).

12.1 Front

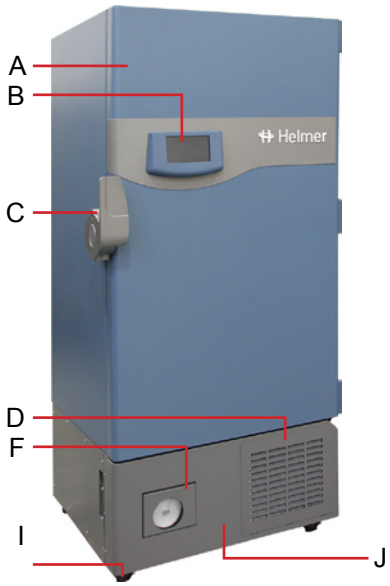


Figure13:

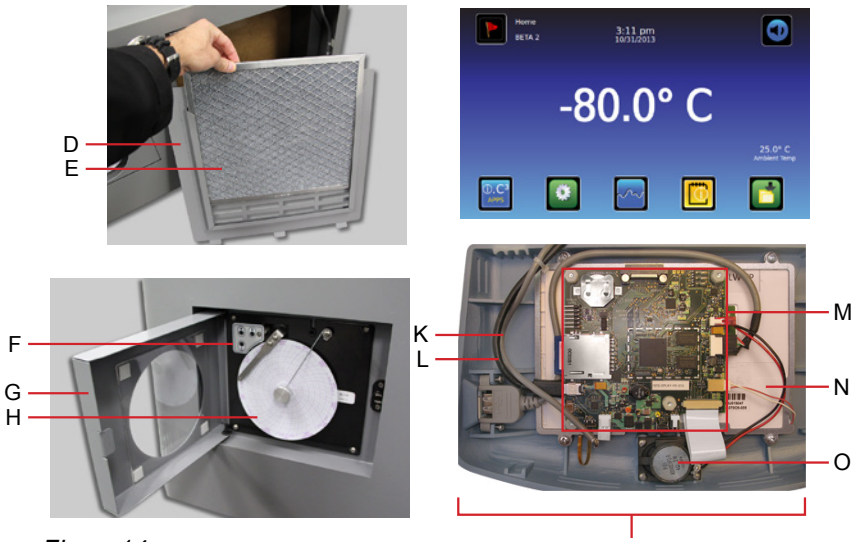


Figure14:

NOTICE The i.C³ display assembly is sensitive to static electricity and can be damaged by electrostatic discharge. Use proper ESD precautions when handling the display assembly.

Label	Description	Service Kit Number
A	Door	-
B	i.C³ user interface	800165-1
C	Door handle with key lock, electronic lock, and padlock hasp	-
D	Condenser grill	800202-1
E	Condenser grill filter	800159-1
F	Chart recorder (optional)	800196-1
G	Chart recorder door	-
H	Chart paper (52 sheets)	800197-1
I	Caster (swivel with brake)	800188-1
J	Front bezel (with chart recorder door)	iUF116: 800191-2 iUF118: 800190-2 iUF124: 800193-2 iUF126: 800192-2
K	Interface cable	-
L	Power cable	-
M	Display board	Included in 800165-1
N	Touch screen	Included in 800165-1
O	Speaker	Included in 800165-1

Label	Description	Service Kit Number
P	Display assembly (includes interface cable, power cable, display board, touch screen, speaker, and bezel)	800165-1
Not shown	Front bezel (without chart recorder door)	iUF116: 800191-1 iUF118: 800190-1 iUF124: 800193-1 iUF126: 800192-1
	Leveling legs	800199-1

NOTICE The i.C³ display assembly is sensitive to static electricity and can be damaged by electrostatic discharge. Use proper ESD precautions when handling the display assembly.

12.1.2 Exterior Door

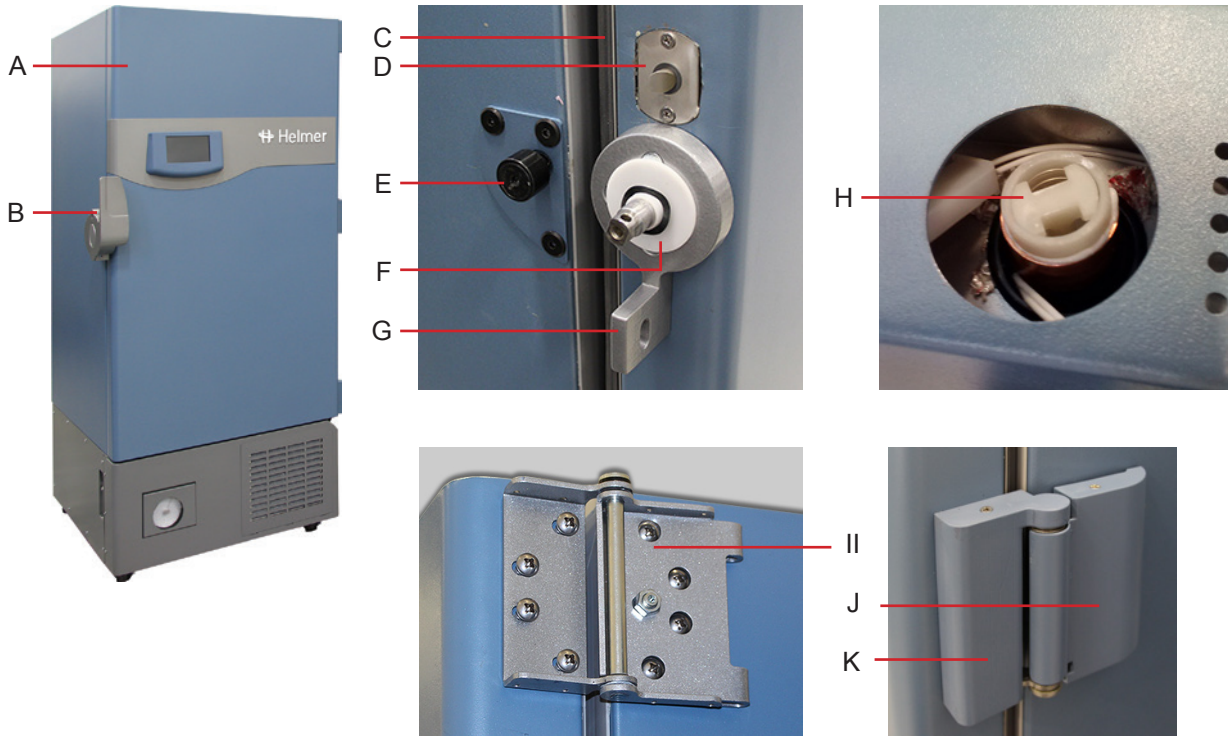


Fig 15: Left: Exterior door features. Fig 16: Center Top: Exterior door handle features (handle removed for clarity). Fig17: Right Top: Vacuum port (cover removed for clarity). Fig 18: Center Bottom: Hinge Fig19: Right Bottom: Hinge Cover

Label	Description	Service Kit Number
A	Door (includes handle, handle bushings, gasket, vacuum port, and Access Control solenoid)	-
B	Door handle (includes keyed lock)	-
C	Exterior door gasket	iUF116: 800176-1 iUF118: 800176-2 iUF124: 800177-1 iUF126: 800177-2
D	Access Control solenoid assembly	800195-1
E	Latch roller	-
F	Door handle bushing	800179-1
G	Padlock hasp	-
H	Vacuum port	800175-1
I	Hinge	800178-1
J	Hinge cover (cabinet side)	322045-1 (included in 800178-1)
K	Hinge cover (door side)	322044-1 (included in 800178-1)

12.2 Side Panel

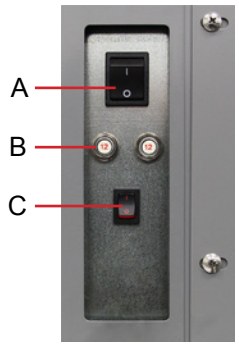


Figure 20: Side panel features.

Label	Description	Service Kit Number
A	AC ON/OFF switch	800171-1
B	Circuit breakers	800172-1
C	Monitoring system backup battery ON/OFF switch	800173-1

12.3 Rear Panel

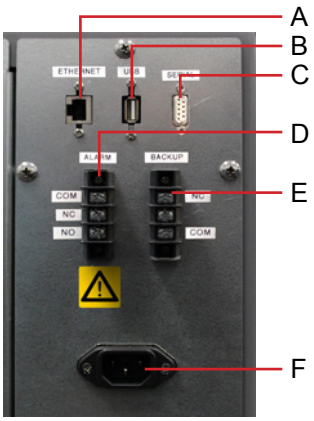


Figure 21: Rear panel features.

Label	Description
A	RJ-45 Ethernet port
B	USB port
C	RS-232 serial port
D	Remote alarm interface
E	LN_2 / CO_2 backup system interface
F	AC power connector

12.4 Electrical Panel

WARNING Removal of the electrical compartment access panel will expose electrical wiring carrying line voltage and control voltage. Ensure the freezer is powered off before removing the access panel.

CAUTION Avoid sharp edges when working inside the electrical compartment.

NOTICE The i.C³ control board is sensitive to static electricity and can be damaged by electrostatic discharge. Use proper ESD precautions when handling the control board.

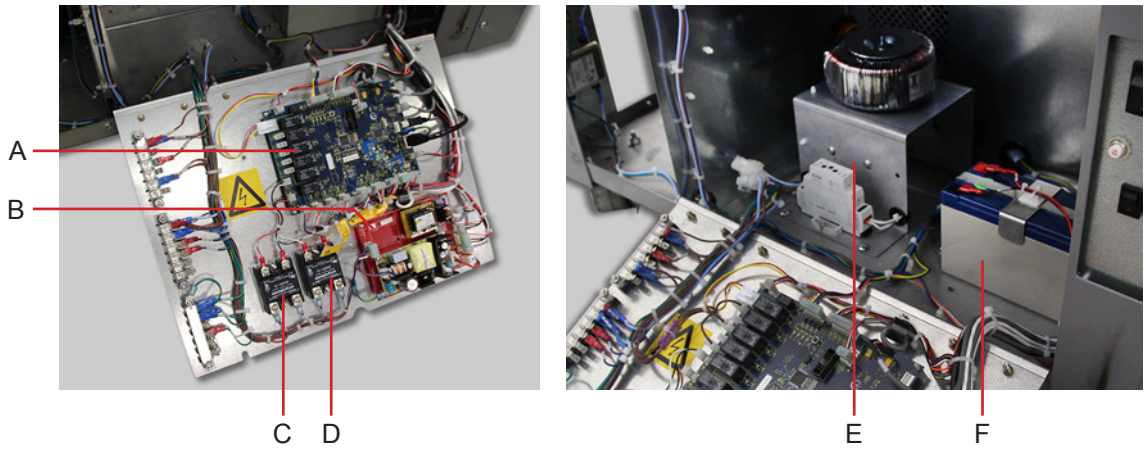


Figure 22: Electrical panel features.

Label	Description	Service Kit Number
A	i.C³ control board	800167-1
B	Power supply board	800168-1
C	Low stage compressor relay	800170-1
D	High stage compressor relay	800170-1
E	Power management module (optional)	800194-1
F	Monitoring system / Access Control backup battery	800174-1
Not shown	RFI filter	-

12.5 Refrigeration Components

12.5.1 Refrigeration Compartment

WARNING Removal of the refrigeration compartment access panel will expose electrical wiring carrying line voltage and control voltage. Ensure the freezer is powered off before removing the access panel.

CAUTION Avoid sharp edges when working inside the refrigeration compartment.

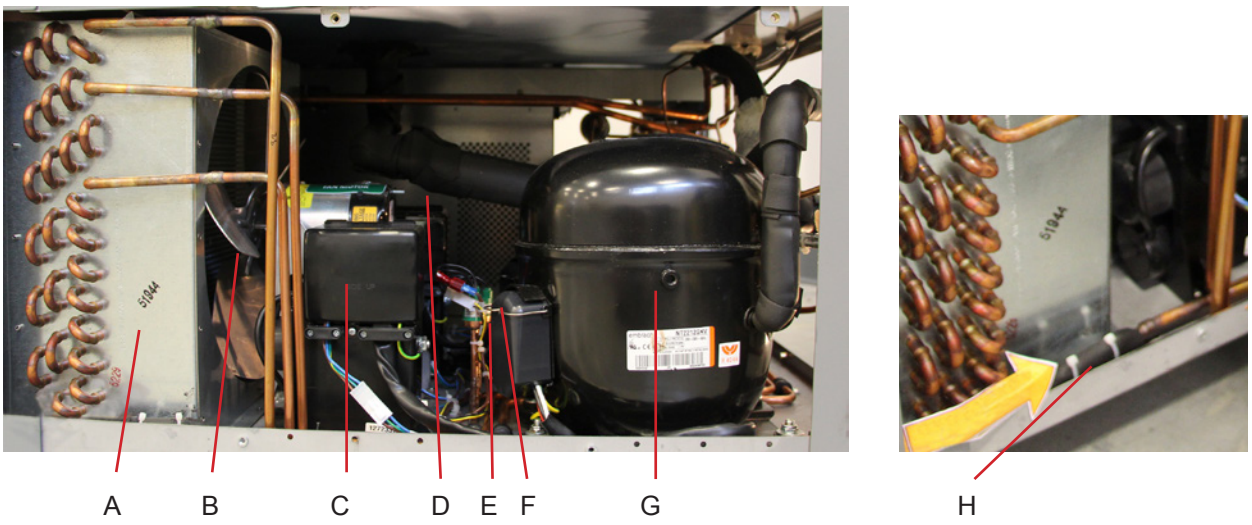


Figure 23: Refrigeration system features (in the refrigeration compartment).

Label	Description	Service Kit Number
A	Condenser	800153-1
B	Condenser fan motor (includes fan blade)	800154-1
C	High stage compressor start components	800151-1
D	Low stage compressor start components	800152-1
E	Low stage high-pressure safety switch (line voltage)	800161-1
F	Low stage high-pressure safety switch (control voltage)	800160-1
G	High stage compressor	800155-1
H	High stage condenser discharge temperature sensor	800169-3
Not Shown	Ambient temperature sensor	800169-1

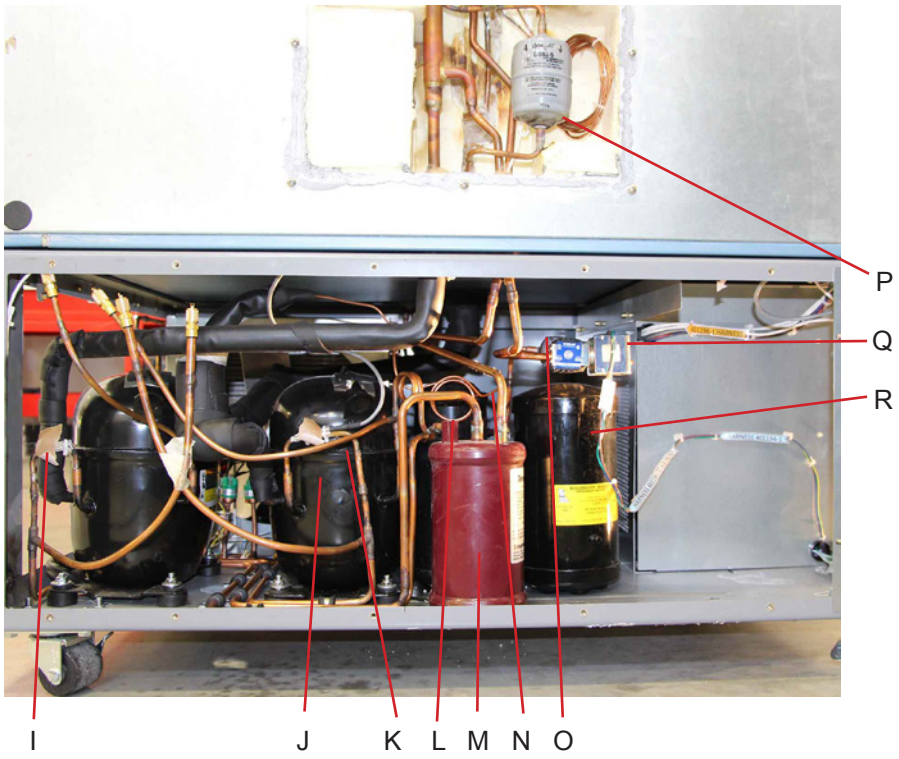


Figure 24: Refrigeration system features (in the refrigeration compartment).

Label	Description	Service Kit Number
I	High stage compressor discharge temperature sensor	800169-2
J	Low stage compressor	800162-1
K	Low stage compressor discharge temperature sensor	800169-4
L	Receiver	-
M	Oil separator (low stage)	Included in 800162-1
N	Expansion tank balancing line (low stage)	800164-1
O	Dryer (high stage)	Included in multiple kits
P	Dryer (low stage)	Included in multiple kits
Q	High stage solenoid (kit includes valve, coil, and dryer)	800158-1
R	Expansion tank (low stage)	-

12.5.2 Cascade Heat Exchanger Compartment

CAUTION Avoid sharp edges when working inside the cascade exchanger compartment.

NOTICE The TXV (thermal expansion valve) is not a serviceable component. To replace the TXV, the cascade heat exchanger assembly must be replaced.

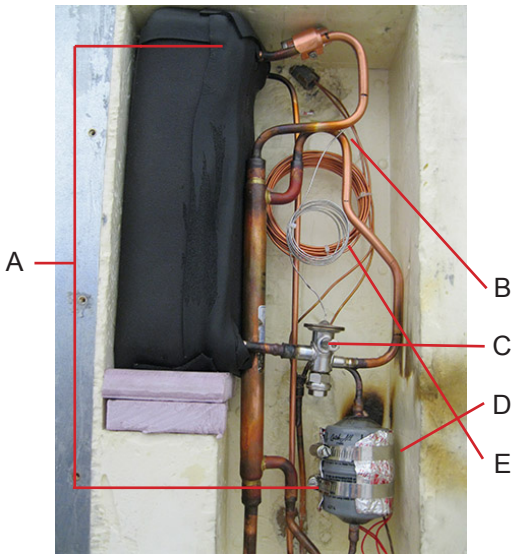


Figure 25: Refrigeration system features (in the cascade heat exchanger compartment).

Label	Description	Service Kit Number
A	Cascade heat exchanger assembly with TXV	800156-1
B	Cascade exchanger temperature sensor	800169-1
C	TXV (thermal expansion valve)	800157-1
D	Dryer (low stage)	Included in multiple kits
E	Capillary metering line (low stage)	800163-1

12.6 Interior

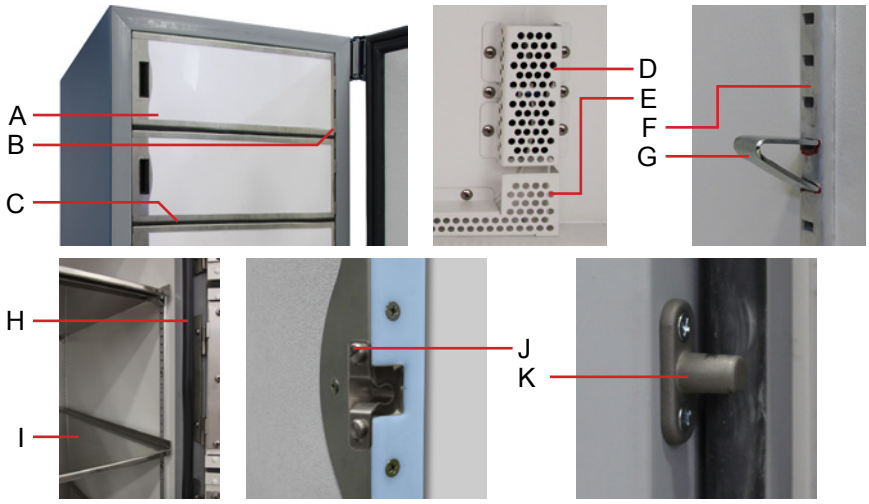


Figure 26: Interior features.

CAUTION Keep hands away from pinch points when closing the door.

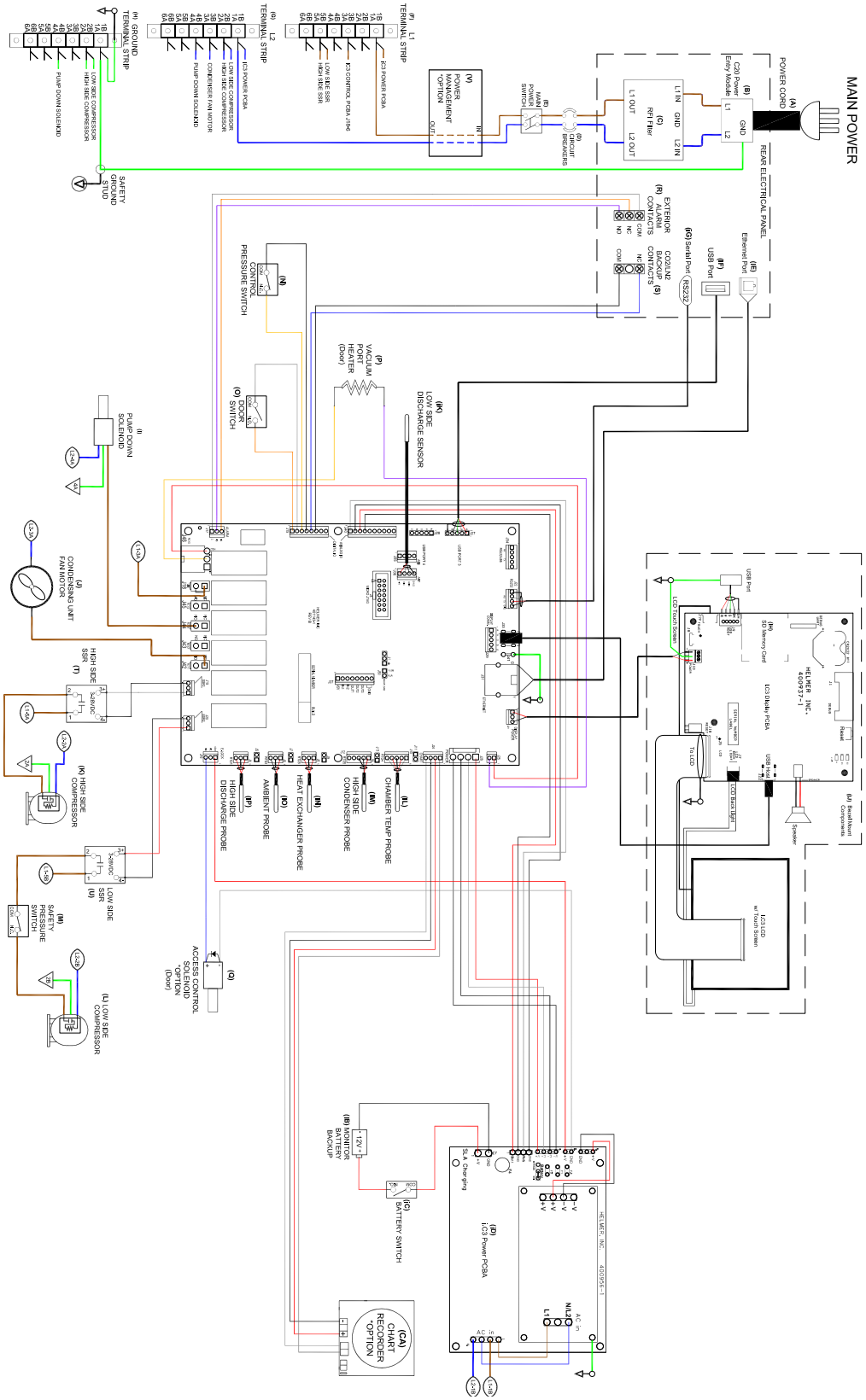
NOTICE

- When removing or replacing storage racks, do not allow the storage rack to set on the top edge of a partially-open interior door.
- To avoid damage to the interior door hinges, do not apply upward or downward force to the interior doors.

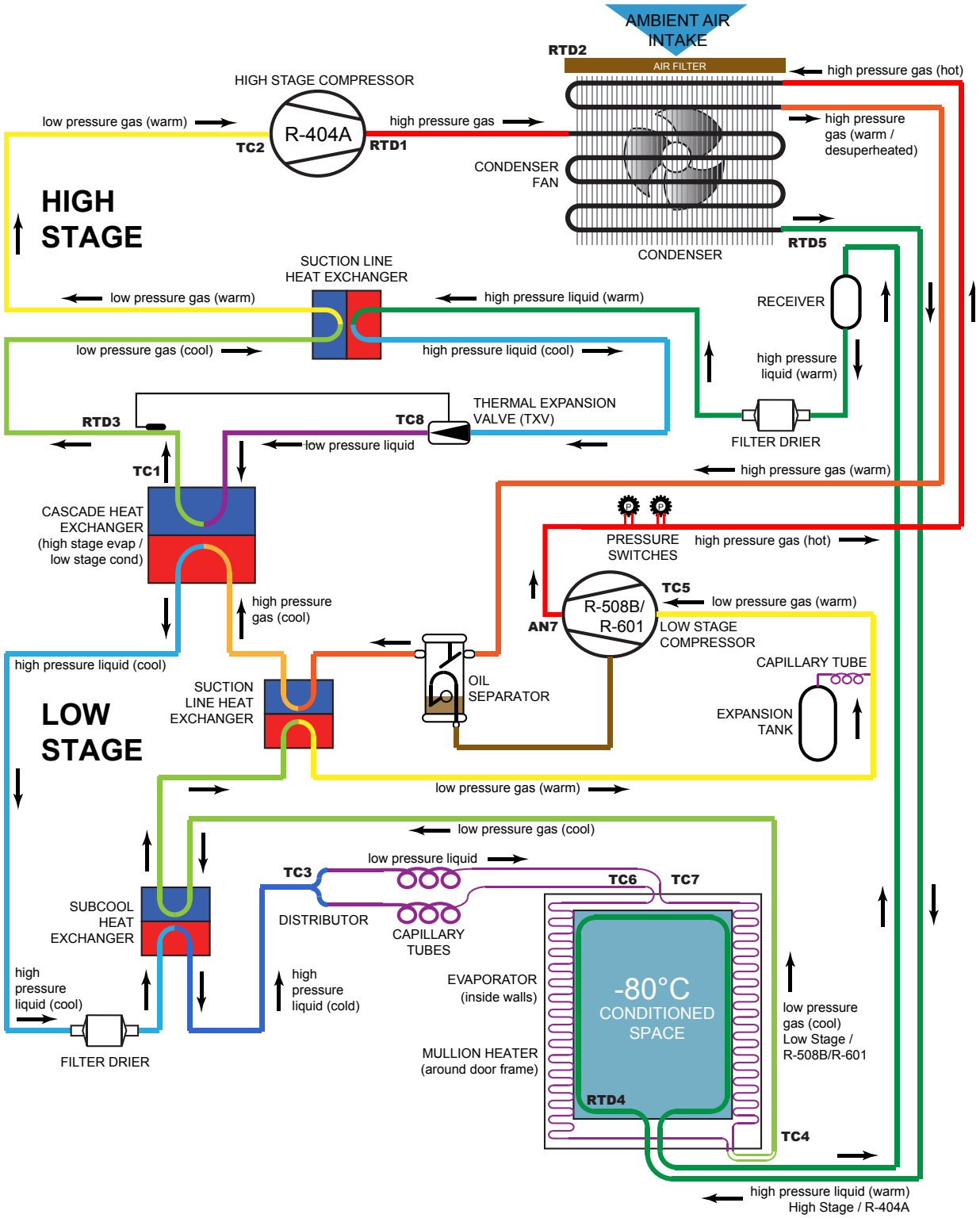
Label	Description	Service Kit Number
A	Inner door	iUF116, (12.25”): 800183-1 iUF118 (9.25”): 800183-2 iUF124 (12.25”): 800183-3 iUF126 (9.25”): 800183-4
B	Inner door hinge	800185-1
C	Inner door gasket	iUF116/118: 800184-1 iUF124/126: 800184-3
D	Chamber temperature sensor cover	-
E	Chamber temperature sensor wire cover	-
Not shown	Chamber / chart recorder temperature sensor (behind cover)	800169-6
F	Shelf standard	-
G	Shelf clip	-
H	Inner door mullion gasket	iUF116: 800187-2 iUF118: 800187-1 iUF124: 800187-4 iUF126: 800187-3
I	Shelf	-
J	Inner door retaining clip	800186-1
K	Inner door catch	800186-1

13 Schematics

13.1 Electrical Schematic



13.2 Refrigeration Schematic



Section VI: Warranty

14 Rel.i™ Product Warranty USA and Canada

For technical service needs, please contact Helmer at 800-743-5637 or www.helmerinc.com. Have the model and serial number available when calling.

14.1 Rapid Resolution

When a warranty issue arises it is our desire to respond quickly and appropriately. The service department at Helmer is there for you. Helmer will oversee the handling of your warranty service from start to finish. Therefore, Helmer must give advance authorization for all service calls and/or parts needs relating to a warranty issue. Any repeat service calls must also be authorized as well. This allows for proper diagnosis and action. Helmer will not be responsible for charges incurred for service calls made by third parties prior to authorization from Helmer. Helmer retains the right to replace any product in lieu of servicing it in the field.

14.2 Compressor

For the warranty period listed below, Helmer will supply the refrigeration compressor, if it is determined to be defective, at no charge, including freight. Helmer will not be liable for installation, refrigerant, or miscellaneous charges required to install the compressor beyond the first year of the warranty period.

► i.Series model compressor warranty period is five (5) years.

14.3 Parts

For a period of two (2) years, Helmer will supply at no charge, including freight, any part that fails due to defects in material or workmanship under normal use, with the exception of expendable items. Expendable items such as glass, filters, light bulbs, door gaskets, and monitoring system backup battery are excluded from this warranty coverage. Inspection of defective parts by Helmer will be final in determining warranty status. Warranty procedures must be followed in all events.

14.4 Labor

For a period of two (2) years, Helmer will cover repair labor costs (including travel) and the cost of refrigerant and supplies necessary to perform authorized repairs. Repair service must be performed by an authorized Helmer service agency following the authorization process detailed above. Alternatively, your facility's staff may work with a Helmer technician to make repairs. Labor costs for repairs made by unauthorized service personnel, or without the assistance of a Helmer technician, will be the responsibility of the end user.

14.5 Additional Warranty Information

The time periods set forth above begin two (2) weeks after the original date of shipment from Helmer. Warranty procedures set forth above must be followed in all events.

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE SHALL APPLY.

THE LIABILITY, IF ANY, OF HELMER FOR DIRECT DAMAGES WHETHER ARISING FROM A BREACH OF ANY SALES AGREEMENT, BREACH OF WARRANTY, NEGLIGENCE, OR INDEMNITY, STRICT LIABILITY OR OTHER TORT, OR OTHERWISE WITH RESPECT TO THE

GOODS OR ANY SERVICES IS LIMITED TO AN AMOUNT NOT TO EXCEED THE PRICE OF THE PARTICULAR GOODS OR SERVICES GIVING RISE TO THE LIABILITY. IN NO EVENT SHALL HELMER BE LIABLE FOR ANY INDIRECT, INCIDENTAL, CONSEQUENTIAL, OR SPECIAL DAMAGES, INCLUDING WITHOUT LIMITATION DAMAGES RELATED TO LOST REVENUES OR PROFITS, OR LOSS OF PRODUCTS.

This warranty does not cover damages caused in transit, during installation by accident, misuse, fire, flood, or acts of God. Further, this warranty will not be valid if Helmer determines that the failure was caused by a lack of performing recommended equipment maintenance (per Helmer manual) or by using the product in a manner other than for its intended use. Installation and calibration are not covered under this warranty agreement.

14.6 Outside of USA and Canada

Consult your local distributor for warranty information.

END OF MANUAL

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